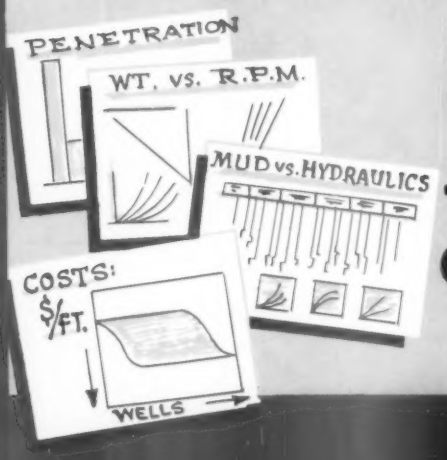
the OIL AND GAS JOURNAL
PUBLISHED WEEKLY AUGUST 22, 1960

How to reduce costs with



DRILLING-ANALYSIS CHARTS

p. 66

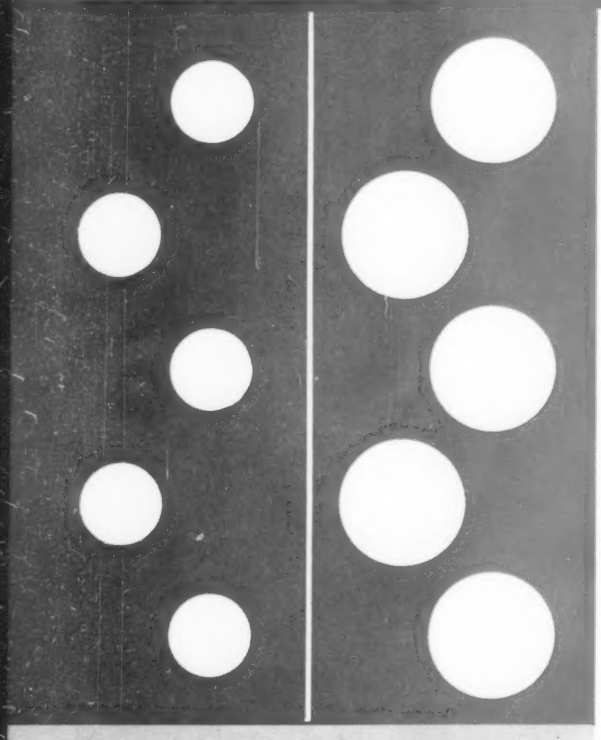
Another FIRST by LANE-WELLS

BIG HOLE PERFORATING

For Formation Treating

56% LARGER Diameter • 144% LARGER Opening

780 SUPER E BULLET



Comparison of area of standard perforations (above, left) and 780 Super E perforations (above, right).

You are looking at the actual size of perforations produced by Lane-Wells new 780 SUPER E BULLET Perforating. Compare these holes with the size of perforations produced by standard bullets—compare the hole size with even smaller holes by other types of perforating.

Designed especially to produce a large hole and maximum formation cracking, the 780 SUPER E BULLET really paves the way for hydraulic fracturing, explosive fracturing, acidizing, and other types of formation treatments. Because the 780 SUPER E BULLET is fired by a standard Lane-Wells Type E gun, you get all the advantages of selective firing and proved performance.

Ask your nearest Lane-Wells representative about this newest service by the company that originated perforating for the petroleum industry!

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HOUSTON, TEXAS
LOGGING · PERFORATING · PACKERS · BRIDGING PLUGS

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OIL AND GAS JOURNAL
Vol. 58, No. 34

Contents August 22, 1960

THE WEEK'S NEWS

General Interest:

Major Suppliers Call for End of Equipment Shows ... 48
Suppliers, Service Companies Slowing Down on Gifts to Oil Men ... 50
Gulf Moves Marketing to Houston, Names New Management Team ... 59
Hess, Scurlock Will Buy Gulf's Mississippi Holdings ... 59
Photos in the NEWS ... 60

Drilling-Production:

East Texas Is Target of New Production Cost-Cutting Idea ... 44
Texas Holds Allowable to 8 Days for Fifth Month ... 53
Three Companies Have Plans for Athabasca Sands ... 53

Pipelining:

FPC Approves 15-Cent Price for Oklahoma Gas ... 51
Pipeline Briefs ... 52
Michigan Wisconsin, Transco Plan Major Expansion Projects ... 54
California Commission Clears Gas Line from Alberta ... 57

Processing:

Wider Use of Diesel Engine in Commercial Vehicles Predicted ... 47
Residual Imports Fall Short of Oil's Hopes ... 56
Processing Briefs ... 56

Foreign News:

Reds Busy Lining Up Tankers for Cuban Run ... 52
Most Middle East Crude Postings Changed ... 62
Price Cuts Show Foreign Preference for Heavy Crude ... 63
Colombia Asks Forest Oil to Break Secondary-Recovery Contract ... 64
Pakistan Presses for Additional Product-Price Cuts ... 64
Nearby Moroccan Strike Adds Optimism to Spanish Sahara Work ... 64
Russian Pipeline Will Open Siberian Gas Production ... 65
Big French Company to Enter British Marketing Picture ... 65
Foreign Briefs ... 65

Exploration:

Humble Will Drill Deepest Georgia Wildcat ... 54
Green River Basin Turns Up Rare Mesaverde Oil ... 127
Why Alaska Is One of World's Best Places to Find Oil ... 128
July Multiple Completions ... 131

REGULAR FEATURES

Advertisers' Index ... 157
Book Review ... 87
Calendar of Events ... 34
Classified Advertising ... 154
Deaths ... 147
Drilling Contractors ... 123
Drilling Statistics ... 149
Editorial ... 43
Equipment Men ... 115
Exploration Highlights ... 127
Foreign News ... 62
Journally Speaking ... 39
Markets ... 152
New Equipment ... 101
Personals ... 145
Production ... 150
Refining Statistics ... 151
Statistical Summary ... 148
Technical Questions ... 93
The Journal Said ... 39
They Say ... 33
Trade Literature ... 112
Watching Washington ... 49
Who's Who in Oil ... 145

Technology-Operation section on next page →

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TECHNOLOGY—OPERATION

Drilling-Production

Drilling-Analysis Charts Reduce Well Costs 66

By O. E. Mechem

This is one of the sharpest tools oil-company management has for reducing costs. These charts induce good programing, the key to cutting drilling costs. Management can analyze thoroughly each operation, appraise contractor performance, spot factors which need improving, direct staff studies to improve well planning, and utilize latest research findings.

How Californians Operate Their Water Floods 73

West Coast operators were slow in accepting water flooding because of high-gravity oil and thick producing sections. Now, however, a total of 84 reservoirs in 49 fields are being flooded. Floods range in size from 50-bbl. to 401,000-bbl.-daily water injection.

Oil-Well Pumping—11 98

By Joseph Zaba

Of all the components of the oil-well pumping mechanism, sucker rods have the greatest effect on the action and performance of the whole system. Their behavior in the transfer of forces and loads determines the action of the pump.

Refining-Processing

New Vapor-Recovery Unit at Whiting 72

New Standard of Indiana unit will process 18 million cubic feet of refinery gas daily.

Tow Tractor Is Completely Automatic 81

New unit at Humble's Baton Rouge refinery tows loads up to 4,000 lb. along a predetermined loop. It even opens and closes gates.

Skelly's New Look in Control Laboratories 82

By W. L. Pursell

Better and more accurate testing and control have resulted from the installation of a new building, more floor space for each testing procedure, and use of new and more efficient apparatus.

LPG Truck-Loading Racks Feature Self-Service 90

Pure Oil's trial self-service installation has produced good results. Here are some details of construction and operation.

Questions on Technology 93

Equilibrium data for absorption of H_2S in amine solution. Pipeline contamination by TEL, other additives. Pressure, instead of draft in tube-still heater.

Upkeep Cost Reduced On Automatic pH Control 95

By Ralph G. Sproston, Jr.

The new waste-water drilling unit at Shell Chemical's Houston plant features refinements that improve the reliability of automatic pH control systems and reduce the high maintenance costs that are usually associated with them.

Pipelining

Solid-State Supervisory Control Performs Well 77

By E. B. Stephenson

The first industrial supervisory control and telemetering system to use solid-state components throughout is operating on the Cherokee Pipe Line Co. products system. Reliability of the system and life of electronic components have been more than satisfactory.

the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
August 22, 1960

Russia is succeeding in getting oil to Cuba:

New York shipping circles now believe the warning of the oil majors to tanker owners against hauling Russian crude won't choke off supplies to the Castro-seized refineries.

Soviets have taken advantage of a depressed tanker market to find enough bottoms to keep the refineries running at half capacity. Odds are they can continue at this rate which will avert a fuel crisis in Cuba (p. 52)*.

Russian threat again is being used by Pakistan officials to put the squeeze on product importers for a price cut.

Pakistan now wants a price cut matching the 11% reduction granted neighboring India. Pakistan earlier won a 7% cut on the threat of Russian help in oil exploration. Same tactics are being used to get even cheaper products (p. 64).

▼ ▼ ▼

The Washington beat:

William R. Connole may return to the FPC and become its chairman—if the Democrats win the White House in November.

Connole, an independent, was dumped this year by President Eisenhower, who simply said he could get a better man. Some Democrats charged Connole lost out because he "protected" consumer interests.

Bear in mind that the new President will be able to name three members—a majority—by midyear because of an existing vacancy, one interim appointment, and the expiration of the term of Arthur Kline next June 30.

Coal interests are still making some progress in their drive to get Congress to order a fuels study.

Last week the chairman of the Senate interior committee sent to the rules committee a resolution calling for the study. If the rules committee clears it, the resolution will go to the floor for vote. In the House, it is still tied up in committee.

---

*Refers to article in this issue giving more details. Where no page is given, the item is a Newsletter exclusive.

Although the resolution has been watered down since it was first introduced last year, many oil representatives still consider the study unnecessary and a step toward end-use controls.

Efforts to develop a multi-fuel engine for the military are gaining momentum.

Pentagon reports more commercial firms are interested in the project. The aim: An engine that would operate efficiently on a wide range of fuels.

Congress, bogging down in politics, is making little headway. This may endanger passage of helium and leasing bills, although neither is controversial. Supporters still are optimistic.

▼ ▼ ▼

Growing strength of heavy crudes in world markets is being revealed by the Middle East price cuts.

Saudi Arabia's Safaniya crude, heaviest sold in the Persian Gulf, is taking only a 3 to 4-cent cut in the present round of new postings. Lightest crudes are taking cuts up to 14 cents a barrel.

This underscores one trend: Foreign refiners are turning out four times more residual from each barrel of crude as processors in the U. S. Crude is prized for its heavy ends.

The Esso cut is being met in one way or another by most of the other Middle East buyers (p. 62).

Residual imports into the U. S., meanwhile, are likely to become even more controversial in the months ahead.

Interior Department set residual quota for last quarter at 415,000 bbl. daily, about 20,000 bbl. daily below actual imports for same period last year.

New England industrial and business leaders, miffed at a 15-cent hike in fuel-oil prices recently, are preparing to fight back (p. 56).

▼ ▼ ▼

Two trends reveal cost consciousness of supply men:

...Christmas giving this year will be less elaborate. Executives of supply firms—and oil companies too—are trimming their Christmas gift lists, will give less expensive gifts. Some are examining their entire customer-relations program and plan to eliminate any excessive giving (p. 50).

...Oil-equipment shows may be discontinued. Directors of Petroleum Equipment Suppliers Association have asked officials of the Tulsa, Odessa, and Lafayette shows to do just that. Back of the move: High costs of exhibiting and poor sales results. Suppliers say they have better sales techniques (p. 48).

Cost-shaving efforts of domestic producers have now been directed at old, narrow-spaced pools where they may be able to produce the same amount of oil with fewer wells.

At least two operators in East Texas field next month will ask the Railroad Commission for a widespread transfer of allowables to permit one well with a higher allowable to do the production work of several.

Estimated savings for the field run as high as $5 million per year (p. 44).

▼ ▼ ▼

Bright spots in Rocky Mountain exploration:

...Wyoming's Green River basin where Max Pray has found 20,000 M.c.f. daily of gas at his Uinta County wildcat 5 miles south of Church Buttes field. This is first discovery in this part of the basin in many years. Pay is Dakota Cretaceous.

...Western Nebraska has busy areas in Dundy, Frontier, Hitchcock, and Redwillow counties where 13 wells either are drilling or being completed. The region is east of Denver basin in Las Animas and Cambridge arch country.

...New work looms in northeastern Arizona. Reports indicate at least five Devonian wildcats are due soon in area southwest of Boundary Butte field following flurry of farmout deals. Majors with interests in the area are Pan American, Sun, Pure, Superior, Sinclair, and Tidewater.

▼ ▼ ▼

Final approval needed for the Alberta-to-San Francisco natural gas pipeline has been given by the California Public Utilities Commission.

The action will kick off construction of a 1,400-mile, big-inch system (p. 57).

Alaska Pipeline Co., now building a gas line from new gas field on the Kenai Peninsula to Anchorage, has ordered economic and engineering studies on extending the line into Fairbanks.

First gas should reach Anchorage by November. Whether the Anchorage-Fairbanks leg is then undertaken will depend on estimates of cost and profitability of the military and civilian markets at Fairbanks.

▼ ▼ ▼

Industry sidebars:

All the 1960 engineering grads will be placed, according to Engineers Joint Council. Survey shows: 62% with jobs, 11.3% considering job offers; 8% entering military service; 10.1% entering graduate studies; 1.2% with other plans.

Cities Service is considered a likely candidate to consolidate the refining and marketing operations of its various companies in the manner of Jersey and Indiana Standard.

Market Memo

August 22, 1960

The market is approaching an in-between demand period. Peak seasonal demand for gasoline soon will be over, and the beginning of the demand for heating oil will depend on the weather.

As a result refiners are nervously optimistic but uncomfortably quiet on crude runs to stills.

On the bright side: Current seasonal demand for gasoline is good and prices steady. Middle distillate prices have advanced in the Midwest, and Gulf Coast refiners are beating the drums for a one-quarter cent per gallon price advance for late August or early September. But East Coast No. 2 price must advance first.

On the danger side: Continued high crude runs and the rapid weekly buildup of light fuel-oil stocks are eroding the favorable light fuel inventory position.

Gulf Coast product prices are all steady at posted levels for prompt liftings.

Currently 92-RON gasoline is selling at 11.25 cents posted price with several cargoes available for prompt lifting.

No. 2 is firm at posted 8.25 cents with Gulf Coast refiners hoping for a higher price.

The low import quota for residual fuels announced by the Government for October-December period has added new strength to an already firm price of $2.30 per barrel for Gulf Coast bunker C fuel.

In Chicago, recent price improvement of one-half cent per gallon on light fuels brought No. 1 posting to 10.25 cents and No. 2 to 9.5 cents per gallon. Gasoline prices in Chicago are firm at present posted levels.

River markets continued quiet with prices firm and inventories in good shape.

Gasoline offerings show no pressure and a price range of Gulf Coast low up to three-eights cent over that level depending on location is typical.

Occasional reports of overall short position on No. 2 "for the season" are being heard. No. 2 is being held for one-quarter cent over Gulf Coast low posting or 8.25 cents.

Group 3 gasoline for northern shipment is in good demand at posted prices of 12.5 cents for 91-RON and 15.25 cents for 99-RON.

Middle distillates are not pushing the market at their present price basis of 9.5 cents for No. 1 and 8.5 cents for No. 2.

YOU SAVE ON INSTALLATION AND ASSEMBLY WHEN YOUR "SPECS" READ HYATT

Because it saves assembly time, Hyatt makes all separable races interchangeable. You can press a race on the shaft at one work station . . . join it to any assembly of the same part number at a later stage of production. As a result, you save time and cost when you specify Hyatt Hy-Roll Bearings. Hyatt Bearing Division, General Motors Corporation, Harrison, N.J.

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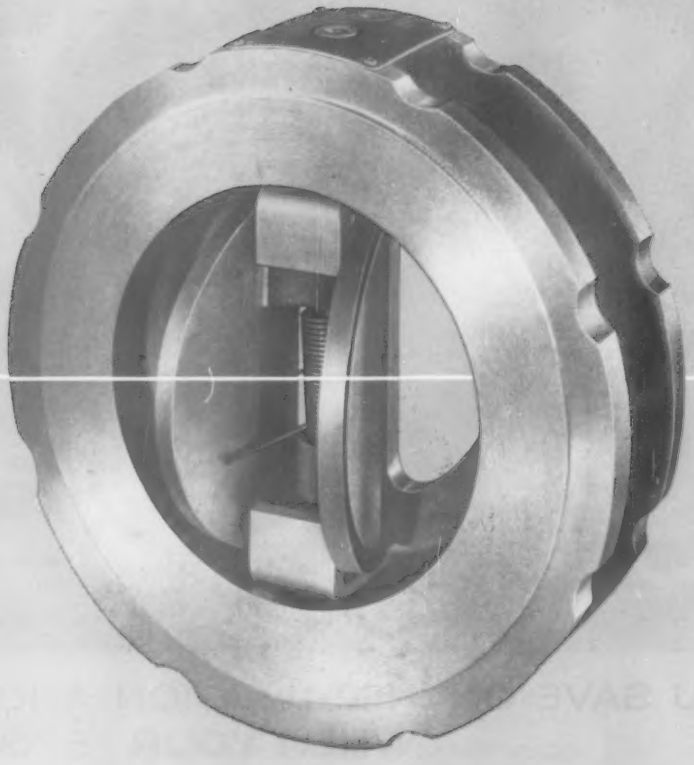
fits between the flanges

less space—weighs only 10% as much



Mission Duo-Chek valves

Mission Duo-Chek Valves weigh approximately 10 per cent as much as conventional check valves. Smaller, lighter Duo-Chek Valves mean that you save on space, weight, installation, and price. But, you are getting a check valve with a bubble-tight seal, anti-slam closure, long life built in. No load is carried on the plate hinges. No external parts. No lubrication required.

The sine wave seal prevents seepage, yet holds without leaking or distortion at maximum test pressure. The sealing material is molded and bonded into a metal groove, making an "O"-ring type seal. Pressure deforms the packing. Metal-to-metal contact completely encloses the sealing material, preventing pinching off under pressure. Available in steel, 316 stainless, aluminum, and bronze to fit ASA raised face or ring joint flanges.

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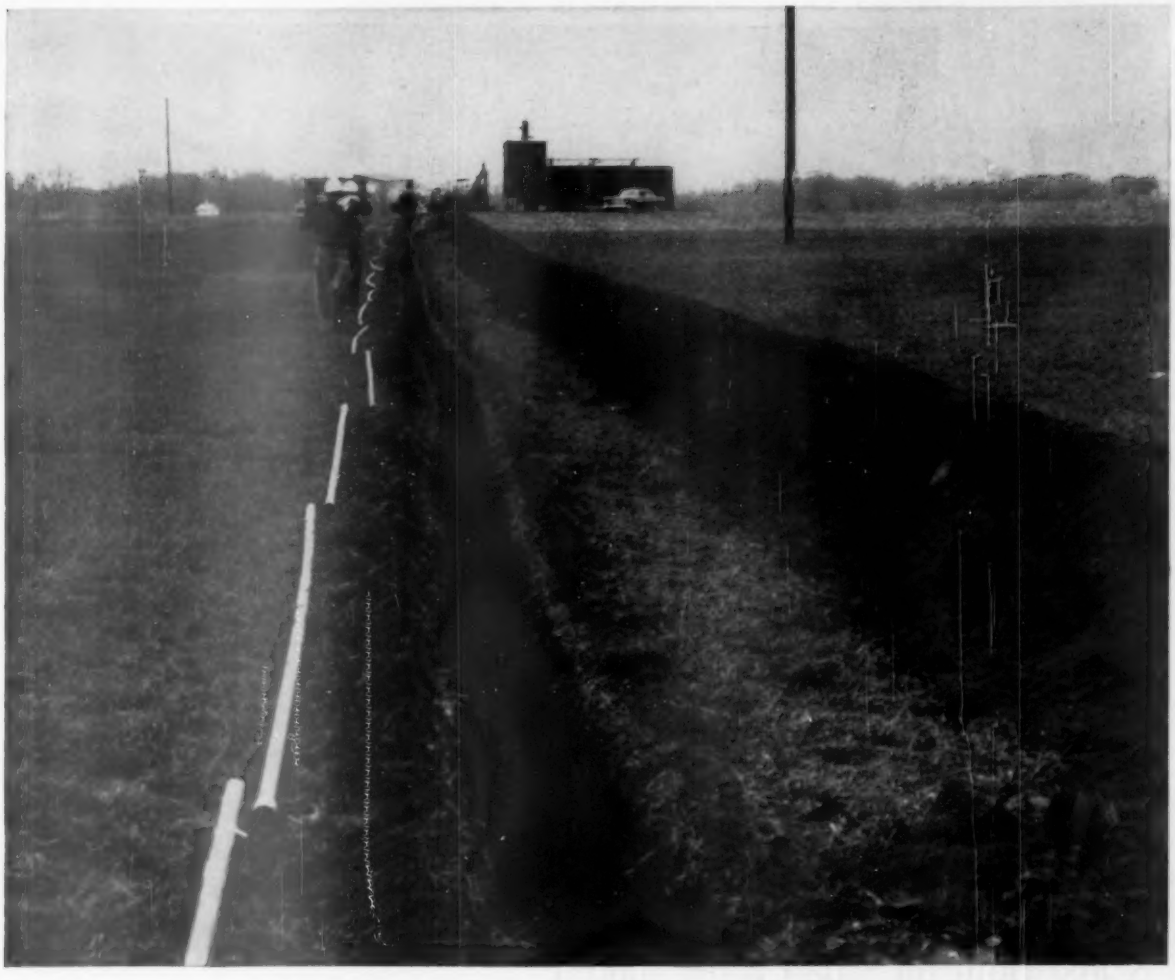


Pipe the easy way to lay salt water disposal lines

Koroseal PVC pipe cuts installation time in half, won't corrode, can't rust or rot, doesn't clog up

INSTALLING a Koroseal pipeline is remarkably easy. It's so light two men can carry 10 lengths of it without strain. It can be laid in half the time it takes to lay steel pipe. And Koroseal can be joined with labor-saving solvent-cementing that will not work with other pipe.

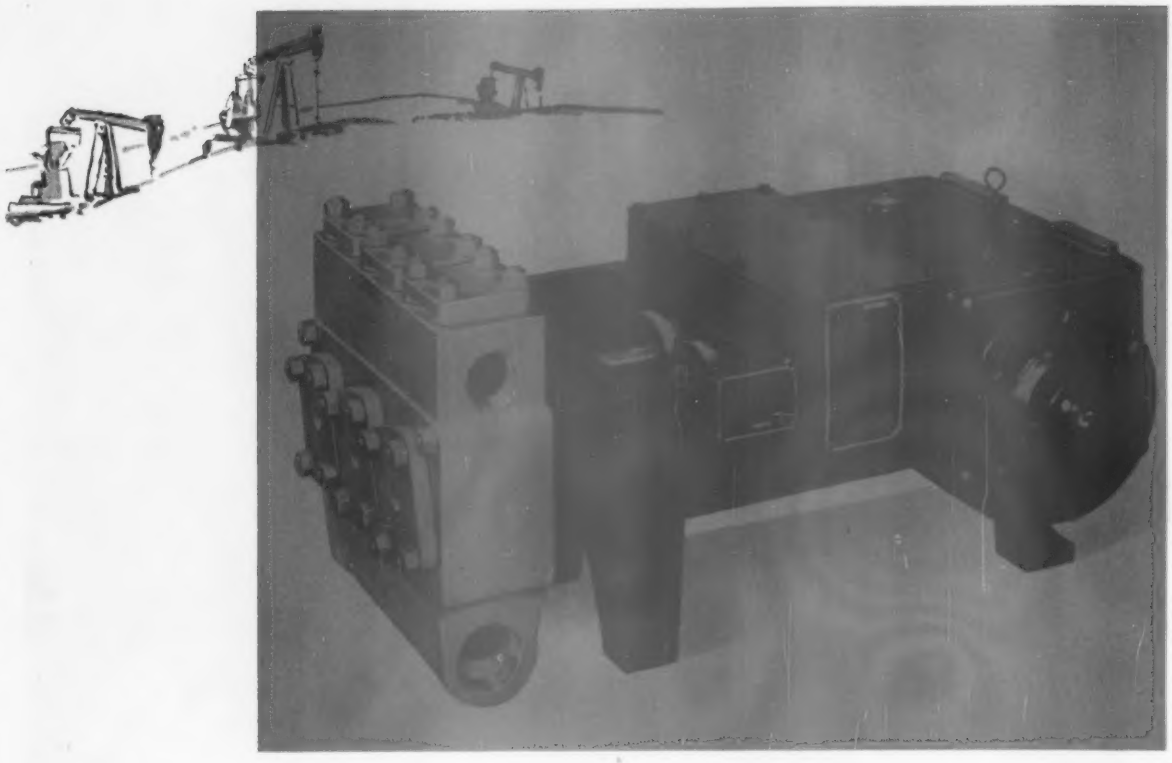
But what makes Koroseal PVC pipe particularly ideal for salt water disposal lines is its ability to resist just about everything that ruins other pipe—corrosion, salt water, chemicals and sour crude oil. It will not rust or deteriorate underground, even in the most severe acid or alkali soils.

Koroseal's mirror-smooth interior finish virtually eliminates the buildup of salt and paraffin that clogs other systems. Because of the smooth interior, a 1½" Koroseal pipeline handles the same quantity as a 2" steel pipe. At the oil field pictured above, the 3390-foot Koroseal disposal line will handle 4200 gallons of salt water a day.

With all these advantages, Koroseal is equally good for crude oil gathering lines, gas lines, transmission lines and many other oil field applications. If you have a problem you think Koroseal might solve, write the *B.F.Goodrich Industrial Products Co., Dept. M-870, Akron 18, Ohio.*

Koroseal—T.M. Reg. U.S. Pat. Off.

Koroseal rigid PVC products by B.F.Goodrich



"Oilwell's" 3-inch stroke plunger pump is just right for small waterfloods!

The A-323 Triplex Plunger Pump is of sturdy, horizontal, three-cylinder, single-acting construction. It is specifically developed for small waterflood and salt water injection programs.

Compact aluminum-bronze fluid end is designed with double suction and discharge connections. Removable stuffing boxes accommodate plunger sizes from 1¼ to 2½ inches for working pressures from 3,000 to 815 psi. It is equipped with stainless steel plate-type valve service with nylon or stainless steel discs.

The power end is a high-strength cast-iron frame with integral cross-head guides. Crankshaft is mounted in shim-adjustable tapered roller bearings.

You can get more information about this 3″ stroke, 50 hp plunger pump, including specifications and performance data, at your nearest "Oilwell" store or from your "Oilwell" representative.

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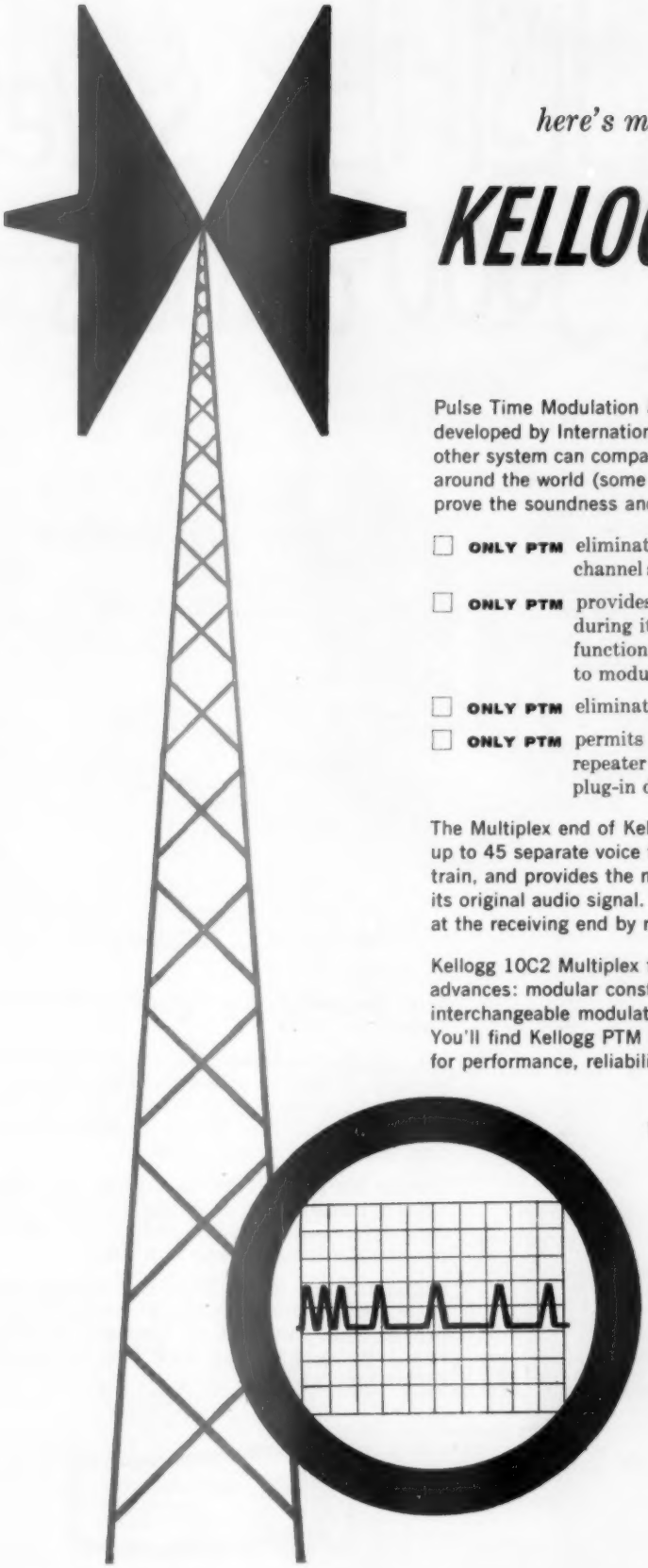

here's microwave at its simplest and best!

KELLOGG 10C2 PTM MICROWAVE

Pulse Time Modulation is the foolproof microwave pioneered and developed by International Telephone and Telegraph Corporation. No other system can compare with it in simplicity and reliability. Installations around the world (some dating back to ITT's early systems in the '30's) prove the soundness and reliability of PTM.

- ☐ **ONLY PTM** eliminates complicated tuning or filtering for voice channel separation. All demodulators are interchangeable.
- ☐ **ONLY PTM** provides separate and distinct channels, open only during its own time interval. Therefore S/N is not a function of channel loading; each channel is insensitive to modulation on the other channels.
- ☐ **ONLY PTM** eliminates frequency displacement over the voice channels.
- ☐ **ONLY PTM** permits *any number* of channels to be dropped at a repeater station. Only one additional modulator and one plug-in demodulator are required to drop each channel.

The Multiplex end of Kellogg 10C2 Microwave system can combine up to 45 separate voice frequency channels into a Time-Modulated Pulse train, and provides the means for restoring each of the channels into its original audio signal. Each signal is sorted into its proper channel at the receiving end by means of the distinctive marker pulse it carries.

Kellogg 10C2 Multiplex features the latest and most efficient engineering advances: modular construction, printed circuitry, plug-in channel units, interchangeable modulators and demodulators, and many others. You'll find Kellogg PTM Microwave meets your highest specifications for performance, reliability and engineering design.

Complete technical details will be sent on request. Write to Kellogg's Microwave Division, Box 2725, Raleigh, North Carolina.

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Kellogg Switchboard and Supply Company, 6650 South Cicero Avenue, Chicago 38, Ill. Communications Division of International Telephone and Telegraph Corporation

ATLAS EMULSIFIER saves $15,125 in 5000′ comparison

Carper Drilling Company of Artesia, New Mexico, is typical of contractors and operators that have been able to effect substantial savings in drilling costs by using an Atlas emulsifier. Here is a direct comparison of the drilling records of Carper's State MA-A #1, located in Lea County, New Mexico, Section 31, 17S, 33E, and an offset well in Eddy County, Section 29, 17S, 31E. Both wells were drilled about the same time through the same formation to a total depth of 10,000 feet. The rig used on the Carper well was smaller, having lower power, hoisting, and hydraulic capacity. The comparison well, using a low-solids CMC mud, required over twice as many bits at an additional cost of $7,425; difference in rig time accounted for another $7,700 . . . a total of $15,125 in tangible savings.

DRILLING RECORD COMPARISON

	STATE MA-A #1	OFFSET WELL
Mud	Atlosol emulsion	low-solids CMC
Interval	5,123′-10,015′	5,263′-10,011′
Feet Drilled	4,892	4,748
Rig Hours	857	997
Feet per hour	5.7	4.8
Bits	27	60
Feet per bit	181	79
Weight on Bit	30,000-45,000#	60,000-65,000#
Drill Pipe	3½″	4½″
Drill Collars	17—6″ x 2¼″	20—7″ x 2¾″
Pumps	1—18″ 1—14″	2—20″
Liner Size	5½″	6½″

Atlas emulsifier is sold through distributors under these tradenames . . . each is the product of Aquaness Department, Atlas Powder Company:

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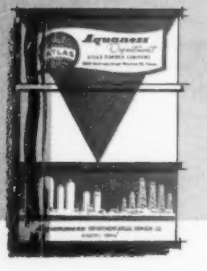

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Distributed by Milwhite Mud Sales Company and other selected mud companies

Registered trademark Atlas Powder Company

Atlas Emulsifiers Improve a Good Drilling Fluid.

Better Hole Conditions. Torque is decreased as much as 50% . . . the hole is kept cleaner and pump pressures are correspondingly lower. There is less danger in loss-circulation and low-pressure zones.

Longer Bit Life. Prevents balling, provides better cutter and bearing lubrication. Greatly extended bit life reduces bit costs, reduces rig hours lost to trip time.

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Stewart & Stevenson Self-Propelled, diesel powered, Airport Utility Unit providing electric power for a giant Boeing 707 Jet Liner.

Stewart & Stevenson RIGELECTRIC engine electric power unit supplying power for drilling operations on Laughlin Porter's oil drilling rig in Africa.

When it comes to diesel or gas engine power, Stewart & Stevenson experience and "know-how" have no boundaries.

Here again are two diesel engine power applications . . . in direct contrast and in opposite parts of the world . . . with one important characteristic in common: both were designed and built by Stewart & Stevenson Services, the world's largest distributor of diesel engines. Both power applications are serving vital industries where thousands of dollars and valuable contracts are totally dependent on the reliability and performance of this engine driven equipment.

When you need power . . . for any application in any part of the world . . . Stewart & Stevenson's experience, service organization and engineering will guarantee dependable performance. We will be glad to study your power needs and submit recommendations. Please write for additional information.

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THE WORLD'S LARGEST DISTRIBUTOR OF DIESEL ENGINES

"The people who manufacture and sell equipment, service rigs, and do the actual drilling — they're risk-takers, too."
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President
Continental Oil Company

"Much of the credit for progress can be given the equipment and service industries."
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President
Delta Drilling Company
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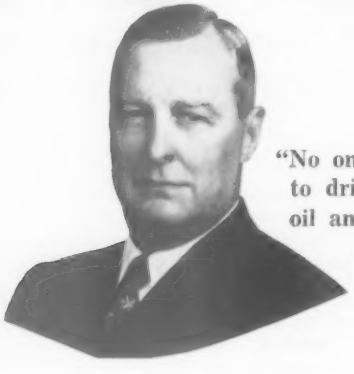
American Association of Oilwell Drilling Contractors

P.E.

"Great contributions have been made by all elements."
J. L. Latimer
Senior Vice-President
Mobil Oil Company



"No one producer is self-sufficient to drill for and produce oil and gas without assistance."
Mr. W. K. Whiteford
President and Chief Executive Officer
Gulf Oil Corporation

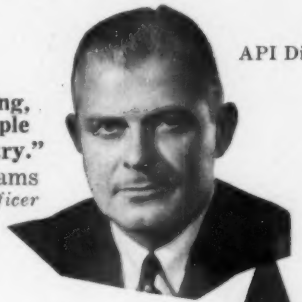
"Those companies strive side by side with producers toward a common goal."
Mr. W. K. Warren
Chairman of the Board and Chief Executive Officer
Warren Petroleum Corporation

"A vital part of the oil industry, they provide equipment, processes, research and engineering skills that have helped make our industry what it is today."
Mr. P. C. Spencer
Chairman of the Board
Sinclair Oil Corporation

"We in the oil industry sincerely praise the equipment manufacturers, suppliers and service companies."
Mr. T. S. Petersen
President
Standard Oil Company of California

"One group which too frequently does not receive recognition for its important role."
Mr. A. W. "Tommy" Thompson
President
A. W. Thompson, Inc.
Past President
A.A.O.D.C.
Past Vice-President
API Division of Production

"The fighting, driving, progressive spirit of these people is indicative of the whole industry."
Mr. K. S. Adams
Chairman and Chief Executive Officer
Phillips Petroleum Company



S.A.*

"Manufacturing, service and supply companies are valued partners."
Mr. Jake L. Hamon
President
Hamon Oil Company
Past Chairman of the Board
American Petroleum Institute, 1956-1957

"Never before has the need been greater than today for the utilization of better tools and advanced techniques in the recovery of oil and gas."
Joseph N. Pew, Jr.
Chairman of the Board of Directors
Sun Oil Company

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

PROUD TO BE PART OF A PIONEERING INDUSTRY

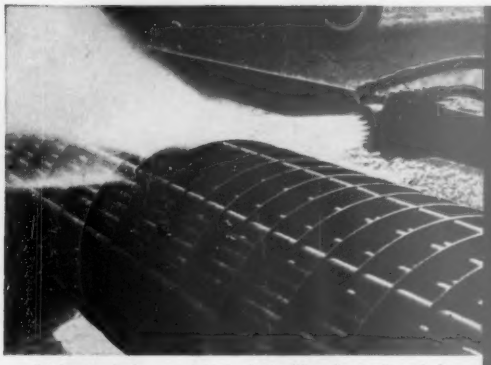
*

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

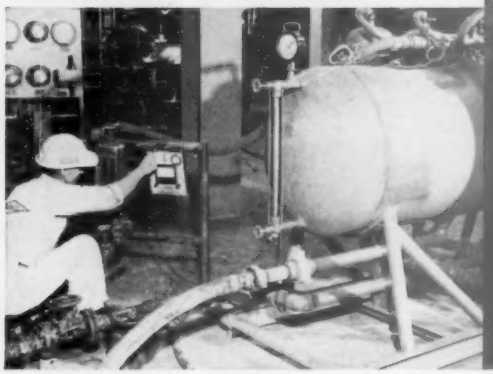
OIL INDUSTRY SUPPLY, MANUFACTURING AND SERVICE COMPANIES

"Getting supplies and equipment ordinarily involves no more than reaching for the telephone."
Mr. H. S. M. Burns
President and Chairman of the Executive Committee of the Board of Directors
Shell Oil Company

A new mark for a nation-wide cleaning service . . . DOW



Jetting tool cleans tubes fouled with coke and asphalt.



New mobile foam-cleaning equipment cuts cleaning costs.

Cleaning missile lines and components requires tolerances as close as 150 microns.

DOW INDUSTRIAL SERVICE

Industrial Cleaning. Dow Industrial Service, now a separate division of The Dow Chemical Company, offers the only nation-wide chemical cleaning service for virtually all types of industrial processing equipment. This is an expansion of the cleaning service developed over the past 20 years. Dow is currently servicing entire plants as well as doing special cleaning jobs for both large and small companies.

Dow Industrial Service research in industrial chemical cleaning has developed specialized mobile equipment and techniques, some of which are pictured above. These highly efficient techniques are improving plant productivity and reducing equipment downtime in all industries using steam generators, condensers, heat exchangers, towers, water and product lines, water wells and tanks, or similar process equipment.

Product Sales and Service. The sale of specialized chemical products, scientifically formulated to be of use in specific industrial processes and to give the necessary technical service in their use, is the job of Product Sales and Service. Purifloc* N17 is an outstanding new flocculant cleared by USPHS for use in potable water.

Laboratory Service. Because of the rapid development of chemical products for the municipal and industrial waste and water treatment areas, Dow Industrial Service will take on the service-selling of those products. Also, a consulting laboratory service for municipal and industrial waste and water treatment is provided.

You'll find Dow Industrial Service offices and stations with specialized cleaning equipment and experienced personnel in all major industrial areas. For more information, write to Dow Industrial Service, 20575 Center Ridge Road, Cleveland 16, Ohio. *TRADEMARK

DOW INDUSTRIAL SERVICE DOW *Division of THE DOW CHEMICAL COMPANY*

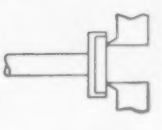
Your *FISHER/MAN* offers you a silent sentinel with hundreds of applications

FISHER TYPE 99

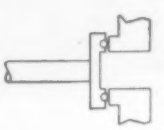
MULTI-PURPOSE PRESSURE REDUCING GAS REGULATOR

This one all-purpose regulator handles literally dozens of complex control jobs that now require several types of regulators in combination. The control installation is simplified. Initial costs are cut. Maintenance on the line is minimized. In a few minutes Type 99 converts to high or low pressure pilot with minimum parts required. If you want additional information about capacities and construction details write Fisher for Bulletin P 99 C.

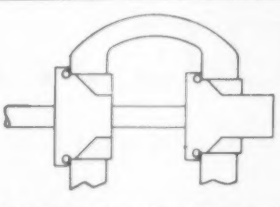
ORIFICE SIZES— INNER VALVE STYLES



⅜" Composition Disc Single Port. Max. Inlet 250 psi. 1⅛" Composition Disc Single Port. Max. Inlet 150 psi.

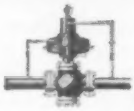


⅜" "O" Ring Single Port. Max. Differential 250 psi. 1⅛" "O" Ring Single Port. Max. Differential 250 psi. (with heavy main spring) 2" "O" Ring Single Port. Max. Differential 40 psi.



2" "O" Ring Double Port. Max. Differential 100 psi.

1. **The factory pre-set spring provides powerful lock-off action.**
2. **Large, effective area of main diaphragm in combination with relay pilot assures trouble-free accuracy.**
3. **It is only a matter of minutes and a minimum of parts to convert to high or low pressure pilot.**
4. **2" threaded or flanged inlet and outlet. Standard hi-tensile iron body for up to 150 PSI inlet, XH or bronze body for up to 250 PSI inlet.**
5. **Composition valve disc assures tight shutoff on zero flow and excellent regulation from low flow to maximum capacity.**



IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD . . . CHANCES ARE IT'S CONTROLLED BY . .

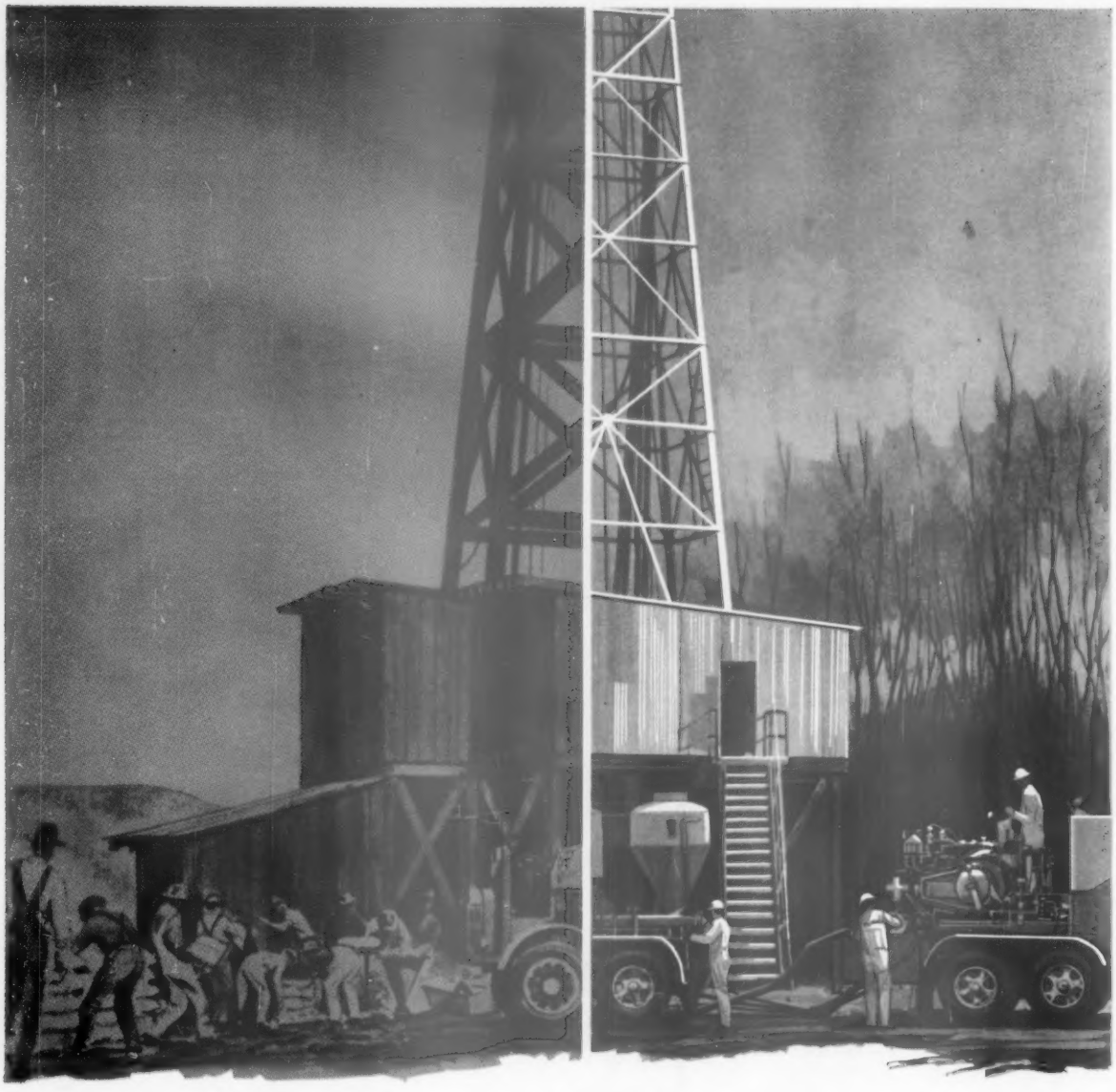
FISHER GOVERNOR COMPANY

Marshalltown, Iowa / Woodstock, Ontario / London, England

CONTINENTAL EQUIPMENT CO. DIVISION, Coraopolis, Pennsylvania

FISHER Controls

SINCE 1880

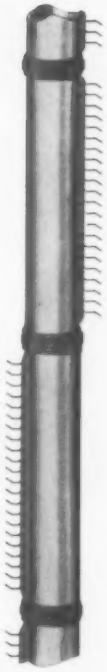


EXPERIENCE...

The best additive to any cementing job

The old and the new – every phase of an oil well cementing job has changed considerably in the span of years represented by this composite illustration – except *one*. That one thing is the wealth of *experience* of the Halliburton men on the job. In 1924 – or the day after tomorrow – our *experience* is your key to confidence. Couple this experience with the finest equipment – like the powerful Halliburton HT-400 cementing units ... pneumatic bulk cement handling units pioneered *first* by Halliburton ... the multitude of well completion tools sampled on the next page – and you have an unbeatable combination. Talk to your nearby Halliburton man before your next cementing job. He will show you how Halliburton experience will work for you.

ALWAYS REMEMBER THESE IMPORTANT CASING TOOLS



Roto Wall Cleaner installed with EZ Lok Clamps

HALLIBURTON ROTO WALL CLEANERS

. . . effectively "extend out" and clean off filter cake from the well bore. The stout metal fingers on each Roto Wall Cleaner are designed to remove filter cake as the casing is rotated.

HALLIBURTON RECIPO WALL CLEANERS

. . . provide another excellent means to clean the well bore of filter cake and help prevent cement channeling. Raising and lowering of the casing literally turns the heavy rubber fingers on this type cleaner "inside out" for maximum cleaning effectiveness.

Recipo Wall Cleaner

HALLIBURTON MODEL S-3 CASING CENTRALIZERS

. . . are designed to help keep the casing centered in the hole and further aid in the prevention of cement channeling.

HALLIBURTON CEMENT BASKETS

. . . are designed to support the cement column above porous formations, or to separate stages in a multiple stage cementing job.

HALLIBURTON EZ LOK LIMIT CLAMPS

. . . are inexpensive, easy to install, and are designed to *stay put* on the casing until the job is completed. They can be used to install all of the tools listed above.

Model S-3 Centralizer

Cement Basket

EZ Lok Limit Clamp

LET YOUR HALLIBURTON MAN HELP YOU SELECT THE TOOLS, CEMENTING MATERIALS AND SERVICE EQUIPMENT THAT WILL HELP *MOST* ON YOUR NEXT CEMENTING JOB.

HALLIBURTON

CEMENTING SERVICES

HALLIBURTON COMPANY · DUNCAN, OKLAHOMA

275 SERVICE CENTERS JUST MINUTES AWAY FROM YOUR WELL

Naugatuck KRALASTIC

The Original ABS Resin

Huge 40-foot length of KRALASTIC pipe is easily carried by one man in Orange County, Cal., during installation of 4-mile pipeline, by Pacific Pipeline Construction Co., Montebello, Cal.

Replaces Metal Pipe for Good

A new 4-mile KRALASTIC® pipeline, being used by Orange County, Cal., to carry natural and sewer gas, not only ends the need for yearly replacement, but made replacement of the original metal pipe far easier than expected.

KRALASTIC WON'T CORRODE. Electrolytic soil conditions caused the metal pipe previously used to fail in a year. Non-electrolytic KRALASTIC is not only unaffected by the soil's acids, but resists attack by most chemicals.

KRALASTIC PIPE IS EASY TO INSTALL. KRALASTIC pipe is flexible—goes easily around bends. Joints are made in seconds by solvent welding. No winches or other heavy equipment are required. One man can easily carry a 40-ft. length of 4½-in. KRALASTIC pipe. On this job, a three-man crew installed the pipe in ⅓ the time it normally takes to install metal pipe.

KRALASTIC IS STRONG. This pipe was tested at 50 psi without rupture. The KRALASTIC pipe also combines toughness, high impact strength, excellent dimensional stability, and high heat resistance with its other desirable properties. In fact, during construction, a heavy truck ran over a section of pipe lying above ground without even cracking it.

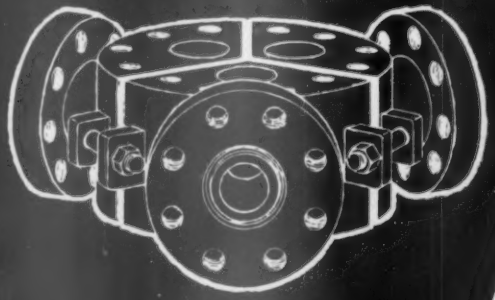
Additional proof of KRALASTIC'S outstanding properties are the more than 14,000 miles of KRALASTIC pipe now in use. For information, see your Naugatuck representative or write:

United States Rubber
Naugatuck Chemical Division
816K ELM STREET
NAUGATUCK, CONNECTICUT

KRALASTIC RUBBER-RESINS • **MARVINOL** VINYLS • **VIBRIN** POLYESTERS

Akron · Boston · Chicago · Gastonia · Los Angeles · Memphis · New York · Philadelphia · CANADA: Naugatuck Chemicals · Elmira, Ont. · Cable: Rubexport, N.Y.

The Ultimate in Flexibility for Triple Completions



TRI FLANGED TEE

THE O·C·T TRI FLANGED TREE

There is *no* doubt about the payout when three good zones can be flowed through one wellhead. There *is* doubt when you use a jumble of complicated equipment.

The O-C-T Crescent Flange Tree is tailored for dual completions. And now we are proud to present the "Tri Flanged Tree" tailored for triple completions.

Like the Crescent, the "Tri Flanged Tree" offers the ultimate in *flexibility*, *simplicity* and *economy*. One valve in this triple hookup can be removed without disturbing the remaining two valves. Or, if necessary, any two valves can be removed without disturbing the third.

If there is a multiple producer on your horizon, talk to the O-C-T representative nearest you. He can solve your equipment problems before the problems arrive.

where progress is a daily practice

O·C·T

OIL CENTER TOOL CO.

SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

Address Export Inquiries for All Countries to
P. O. Box 3091, Houston, Texas.

LATEX OFFERS EXPERIENCE FOR YOUR CONSTRUCTION NEEDS...

LATEX has been associated with the oil and gas industry for over a quarter of a century. Enjoying repeat business from people and companies who demand quality construction. Pipelines are *LATEX'S* Business.

Another quality service of *LATEX* is
CONSTRUCTION OF DISTRIBUTION SYSTEMS.
Invite *LATEX* on your next program.

REMEMBER, LATEX QUALITY CONSTRUCTION BRINGS REPEAT BUSINESS AGAIN AND AGAIN

LATEX
SERVING 1/4 CENTURY

LATEX CONSTRUCTION COMPANY

P. O. BOX 12128 • ATLANTA 5, GEORGIA • CE 3-9414

Wolverine TRUFIN® and STEEL ...go together—naturally!

Where corrosion is not a problem—design and operating engineers are finding that they can cash in on money-saving benefits by specifying Wolverine Trufin in seamless steel.

Trufin – in steel – possesses all of the inherent advantages of integral finned tube. For example:

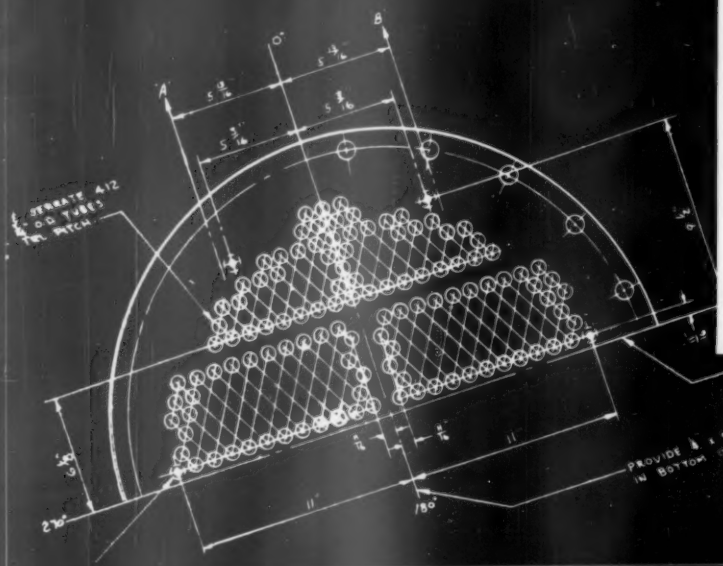
* **In new installations** – Trufin lets you design smaller exchangers without sacrificing capacity. You save on shells, headers, baffles, supports, etc.

* **When retubing**—Trufin's extended surface makes it possible to dramatically increase the capacity of existing exchangers. Trufin Type S/T can be substituted directly for bare tube.

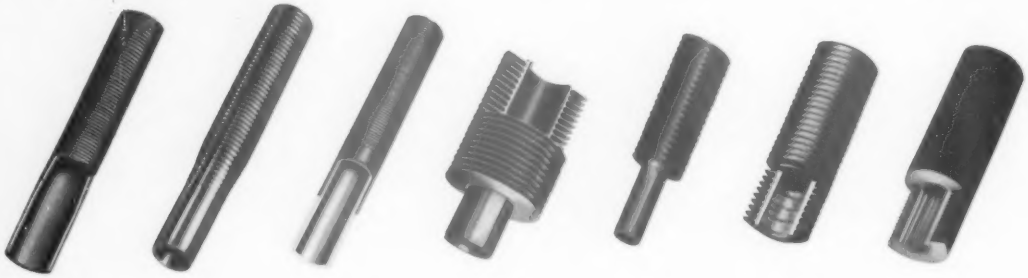
* **Trufin has stamina**—Trufin, because of its integral fins, has the ability to stand up under rigorous operating conditions. Fins are part of the tube wall and are unaffected by the pounding of temperature and pressure changes and vibrations.

Trufin is produced in many types, sizes, and fin spacings – and in steel, copper, copper alloys and aluminum.

WRITE TODAY FOR MORE INFORMATION



Look to Wolverine for the complete line of finned tube

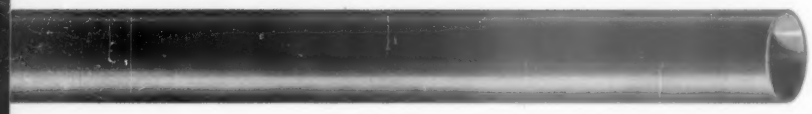


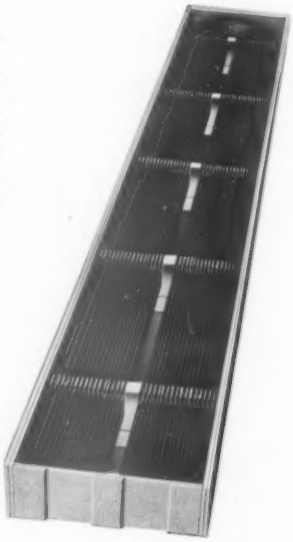
Trufin Type S/T | Trufin Type W/H | Trufin Type S/T (Duplex) | Trufin Type L/C (Bimetal) | Trufin Type H/R | Trufin Type H/A | Trufin Type I/L

Only Wolverine Tube Division of Calumet & Hecla, Inc. can supply you with such a complete line of integrally finned tube – seven different types designed to bring increased efficiency to a wide variety of heat transfer applications. Each type is available in a complete range of sizes and alloys. Ask your Wolverine salesman for information about how these outstanding tubes can help you.

WOLVERINE ALSO OFFERS SPECIAL SERVICES AND SPECIAL PRODUCTS

Wolverine's Field Engineering Service is staffed with specialists trained in tubing selection, alloys, metallurgy, equipment design, etc. Also available for consultation are Wolverine's Heat Transfer Specialists who are located throughout the major processing areas. The services of all these men are yours –without obligation.





. . . AND, OF COURSE, WOLVERINE TUBE also manufactures a complete line of copper, copper alloy and aluminum prime surface condenser tube. Ask your Wolverine sales representative about Wolverine's complete line of products and services.

Wolverine Tube is also a prime mill source for palletized U-bend condenser tubes—manufactures them to your "specs" and ships them to you in disposable box-type pallets so that you can feed directly from pallet to condenser.

WOLVERINE TUBE
DIVISION OF
Calumet & Hecla, Inc.
DEPT. D, 17238 SOUTHFIELD RD., ALLEN PARK, MICH.
Manufacturers of Quality-Controlled Tubing

PLANTS IN DETROIT, MICHIGAN AND DECATUR, ALABAMA. SALES OFFICES IN PRINCIPAL CITIES

Another FRANKS First

The advanced triangular TRI▲SCOPE DERRICK!

Replaces the Double Pole Mast where it is desirable to pull doubles for rod and tubing work.

HANG RODS • RACK PIPE

Greater speed with features such as automatically positioning rod and stacking boards. Top section automatically locks into position.

GREATER STRENGTH

Triangular construction gives greater strength with less weight. Rated 100,000# with 2-to-1 safety factor. 90′ derrick.

LESS GUYING

Minimum guying required for wind protection only. Rigs up faster than clumsy 87 ft. double pole.

HYDRAULICALLY RAISED POWER EXTENDED

Single hydraulic ram raises mast. Excellent visibility adds to many other safety features.

Call your Franks representative for the exciting details, or write for specifications folder.

WELL SERVICING AND DRILLING UNITS

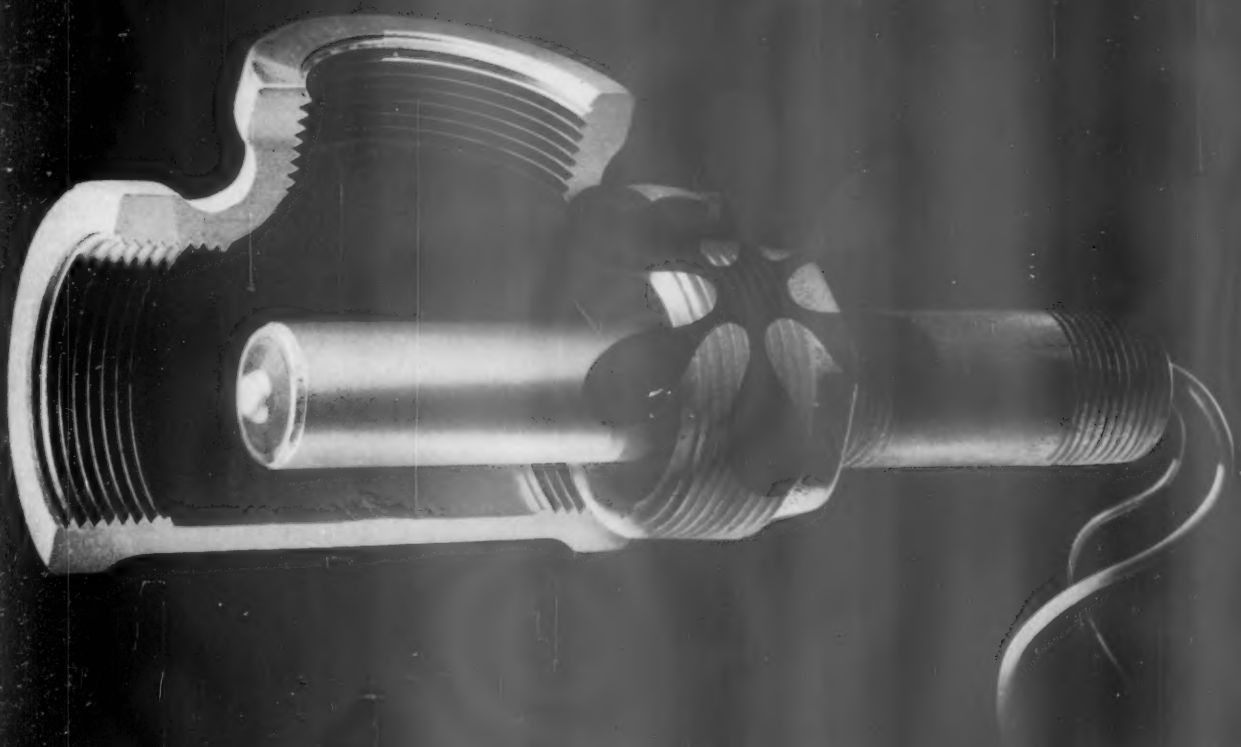
FRANKS

DIVISION OF

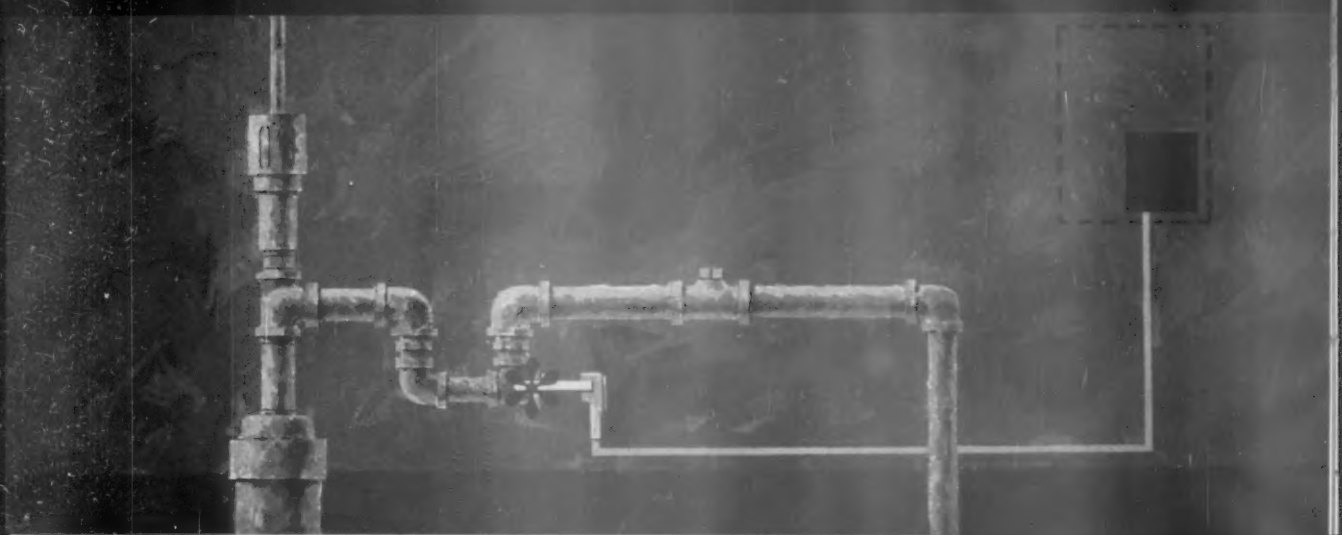
CABOT SHOPS, INC.

PAMPA, TEXAS

New oil well control development from Cutler-Hammer



The Cutler-Hammer thermistor detects pump off, then signals transistorized relay which shuts off pump.



CONTROL

At last! An automatic pump off control that ends dry pumping!

- *Cutler-Hammer's exclusive pump off control for oil wells eliminates severe wear from dry pumping*
- *Cuts pumping time up to 25%, yet maintains maximum oil production . . . saves electricity, too*
- *Field tested for 2½ years . . . proved to lower oil lifting costs*

Now one of the biggest problems in oil well production is solved.

The new Cutler-Hammer Automatic Pump Off Control takes the guesswork out of figuring pump off time.

An ingenious sensing probe, (an electrically self-heated thermistor) measures fluid flow electrically. When the well pumps off, the thermistor signals the transistorized relay which in turn shuts off the pump. *Fluid flow* is the gauge—no other factors influence pump off.

You get maximum oil production without undue wear and maintenance. Even under rapidly changing well characteristics the pump off control matches pumping schedules to well production—a real aid to pumpers.

By preventing just one pump overhaul you save enough to pay for a half dozen or more Cutler-Hammer pump off controls. You can't afford to be without them. This unique control is easily installed with any size pump. Better get Pub. LO-16—Q275 now for full details.

What's new? This new, *better* product is a typical example of what you can expect from the new Cutler-Hammer. We've added new plants, new engineering talent, even a new trademark that symbolizes our new capabilities for the demanding decade ahead. Find out more about our new problem-solving capabilities soon.

WHAT'S NEW? ASK...

CUTLER-HAMMER

CONTROL

Cutler-Hammer, Inc., Milwaukee, Wis. • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C.A. • Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer, Mexicana, S.A.

3 REASONS WHY

EVERY REFINER SHOULD USE...

There are three important and different reasons—and ways—for refiners to use copper deactivator. One or the other applies to every refinery.

COPPER-FREE GASOLINES easily pick up copper in treating, from condensers, valves, lines or contaminated blending stock —or even during transfer of gasoline in bulk or service stations.

NORMAL GASOLINES usually show traces of copper, often enough to reduce or nullify the effect of antioxidants. Through the use of a small amount of AW(50) the amount of inhibitor may sometimes be reduced, at an overall reduction in additive cost!

DISTILLATE OIL BLENDS often form insoluble sediment and darken in color. Whether inhibitors are used or not, a small quantity of AW(50) added to fuel oils minimizes color and sediment deterioration.

UOP Copper Deactivator AW(50) remains liquid down to 0°F, is convenient to use, and is approved for military fuels including aviation gasoline. Write for samples.

UOP
COPPER
Deactivator
AW® 50

*

See our PSE*

Correct selection and most effective use of petroleum inhibitors and additives involves expert analysis and consideration of many factors relating to your feedstock and methods of processing. As specialists for over a quarter-century, UOP is able to provide unparalleled field service, brought to you by a member of our staff of Product Sales Engineers. For detailed information on the UOP family of superior inhibitors and additives, call or write our Products Department.

UOP®

WHERE RESEARCH TODAY MEANS PROGRESS TOMORROW

UNIVERSAL OIL PRODUCTS COMPANY

30 Algonquin Road, Des Plaines, Illinois, U.S.A.

CHECK OIC FIRST...IT PAYS!

DEPENDABILITY is the *first* consideration when you choose a valve, because the cost of valve failure in down time is almost always greater than the cost of the valve itself. That's why so many of the best distributors sell the OIC line. They know that when they recommend OIC valves, their customers can depend upon them...even in those tough problem installations. Equally important is the distributor's own dependability...his capacity to deliver the valves you need, when you need them. Here, OIC offers the support of a complete factory inventory of bronze, iron, ductile iron, cast and forged-steel valves. You get immediate delivery from your OIC distributor's representative stock, and 4 to 5-day delivery from warehouse or factory. For dependability of product and service, phone your OIC distributor. He has our all-out support in serving you.

OIC VALVES

FORGED AND CAST STEEL, BRONZE, IRON AND DUCTILE IRON VALVES

THE OHIO INJECTOR COMPANY • WADSWORTH, OHIO

Low-cost IBM 1620 solves gasoline blending problem

DETERMINES WHICH COMBINATION WILL RETURN THE MOST PROFIT

The low-cost IBM 1620 Engineering Computer takes into account possible solutions to a blending problem and computes your most profitable operating plan.

The IBM 1620 prints out a complete description of its optimum solution, giving you the flow rates, unit severity levels and product compositions which should be used for the most profitable operation. Each variable in the system is accounted for, with complete cost ranges to indicate the sensitivity of your system to the initial cost and product data.

Using linear programming techniques, the 1620 adapts efficiently to changes in your system. These techniques will be made available without cost to IBM customers later this year. This is another example of Balanced Data Processing . . . machines supported by complete services. For information about the IBM 1620 and the special advantages it offers for blending and other important petroleum applications, call your local IBM representative. Like all IBM equipment, the 1620 computer may be purchased or leased.

THE IBM 1620 is an economical, desk-size engineering computer with features previously found only in larger systems. It offers solid state design, magnetic core storage and high-speed internal computing performance. Its versatility and ease of operation recommend it for such petroleum industry applications as distillation problems, unit correlations, evaluation of options and determination of equipment efficiency.

BALANCED DATA PROCESSING **IBM**

An important message for the man who buys

SEAMLESS STEEL PIPE

Produced in accordance with A.P.I., A.S.T.M. and many other international standards, Sumitomo pipe in all sizes and grades is exported to every major area in the world. With half a century of tubular steel production behind it, Sumitomo's modern mills turn out a complete range of seamless and welded steel pipe, including oil country tubular goods, water and gas pipe, scaffolding pipe, special alloy-steel pipe for boilers, etc. Write for our illustrated catalogue.

LEADING PRODUCERS OF STEEL PIPE, WIRE RODS AND ROLLING STOCK PARTS

SUMITOMO METAL INDUSTRIES, LTD.

HEAD OFFICE: OSAKA, JAPAN CABLE ADDRESS: "SUMITOMOMETAL OSAKA"

UNION PIPE, INC.

AGENT OF OIL COUNTRY TUBULAR GOODS & LINE PIPE IN U.S.A.
420 LEXINGTON AVENUE, NEW YORK 17, N.Y.

CONTINENTAL-EMSCO'S

prime movers for unit pumpers are better because

YOU HELPED DESIGN THEM

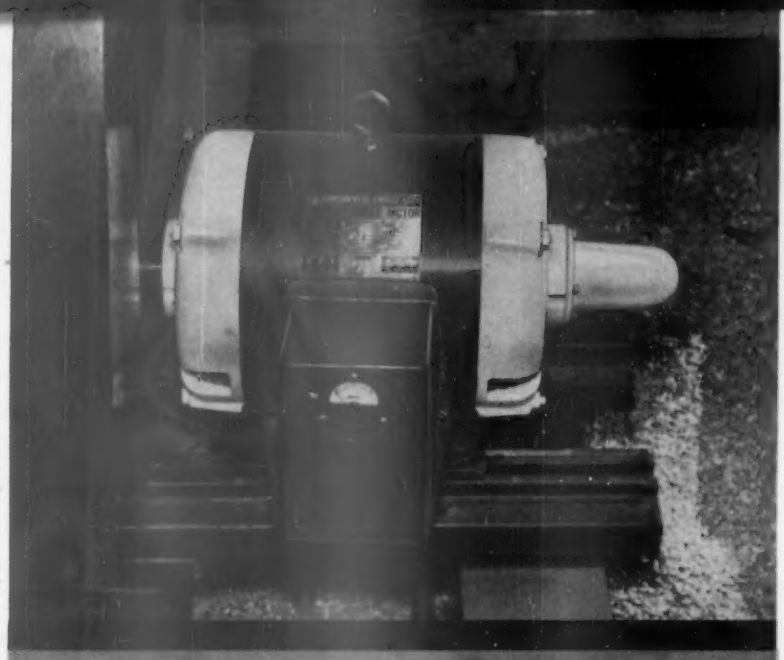
Without your help, C-E Pumping Engines and Green Triangle Electric Motors might have been just another line of prime movers, converted from other industries' applications. But field engineering reports from companies like yours revealed what you wanted . . helped engineer the one line of prime movers for oilfield pumping that fill all your needs for higher efficiency, lower maintenance costs and longer life . . *all at competitive prices.*

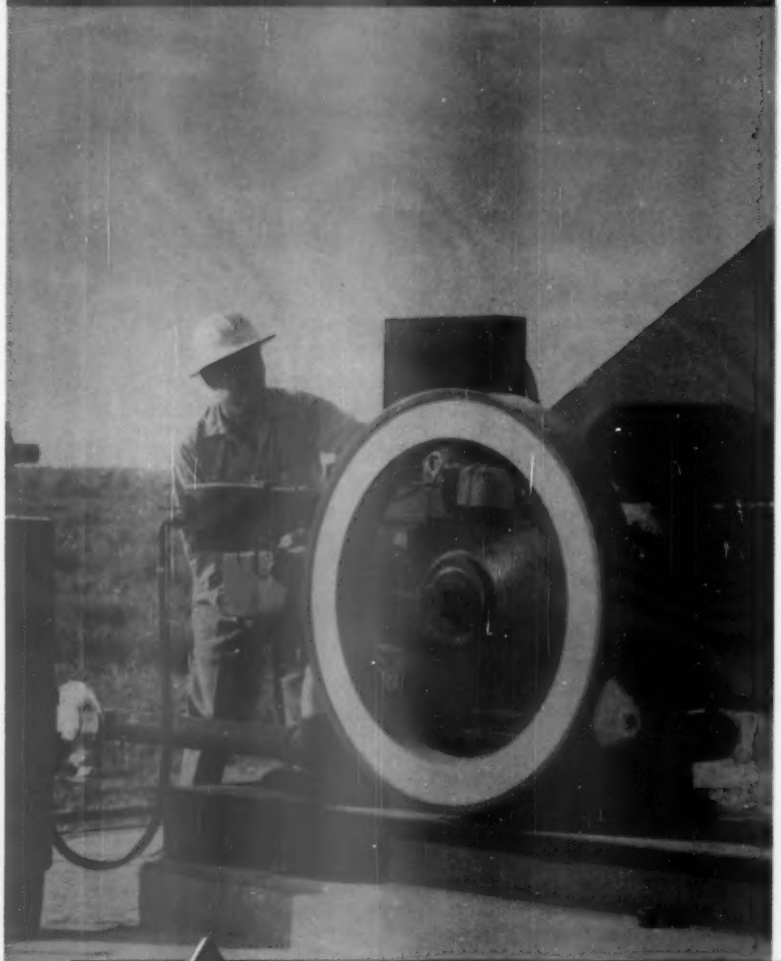
Out of your needs grew the C-E Pumping Engine . . the first medium-speed, single-cylinder model with a unitized clutch — replacing bulkier, more expensive engines. None today match its flywheel effect, simplicity of servicing and operation, and built-in load-limiting feature.

With increased electrification, Continental-Emsco developed the Green Triangle Electric Motor to match your needs for greater efficiency. It was designed to sell competitively, without reducing frame size and copper or increasing the heat rise. It won't run hot or fail prematurely, because it was engineered from the start for unit pumper service . . not adapted by juggling ready-made components.

There are other advantages, too — available only because C-E is a fully-integrated supply company: constant research, devoted exclusively to oilfield problems . . a maintained stock of some 1700 of these prime movers at C-E supply stores, strategically located throughout the oilfields of the U. S., Canada, and Venezuela, fully backed by auxiliary equipment, spare parts and service . . and best of all, *C-E's exclusive WARRANTED APPLICATION.* What other supplier offers so much?

If your responsibility is in management, engineering, or purchasing, you owe it to yourself to write for details — or hear the full story when your C-E man next calls. Get all the facts about the one line of prime movers that offers the most economy per dollar invested . . so that your company, too, can *pump more profits.*





DESIGN FEATURES YOU CAN RELY ON..

Green Triangle Electric Motors

BUILT-IN BALANCE METER.. cuts wear and tear on all well equipment by permitting accurate well counterbalancing. Lower Power Costs.. accurate counterbalancing assures maximum lifting efficiency at the lowest possible electrical cost. **SLIP OF 6-10%**.. starting torque of 275% with 1.15 *guaranteed* service factor, 50° C rise, 130° C insulation.. these features mean lower peak current demands and correspondingly lower power cost.

QUICK AND EASY INSTALLATION.. double-shaft extension, rotation in either direction, leads from either side, and diagonally-split, oversize conduit box give you application flexibility for economical field hook-ups. Hold-down bolts for any unit pumper can be used in motor's 21/32" bolt holes.

ALL-WEATHER DEPENDABLE POWER.. splashproof frame and uni-directional air cooling assure top performance regardless of weather conditions. Enclosure is splash proof by NEMA standards. **SIZE RANGE**.. from 3 to 100 horsepower.

"CONVERTIBLE" MOTORS.. minor modification changes motor from three phase to single phase or back again. Motor delivers name plate rating at 1200 rpm on single phase power. Original cost is generally less than 1200 or 1800 rpm single phase motors. Ready availability and increased salvage value are also assured.

C-E Engines

EASY TO START.. hot, cold or wet weather conditions do not make these engines temperamental. **EASY TO ADJUST**.. governor, valves and carburetor can be reached easily for quick field adjustment. **EASY TO SERVICE**.. no long shutdown here; water or oil can be added and their levels checked while engine is running. **EASY TO REPAIR**.. unit assemblies and essential working parts can be replaced in the field without disturbing other assemblies. **THREE MODELS**, ranging from 10 to 20 horsepower for continuous service. Proven by over 15 years of highly satisfactory performance in oil fields everywhere.. over 30,000 on producing wells.

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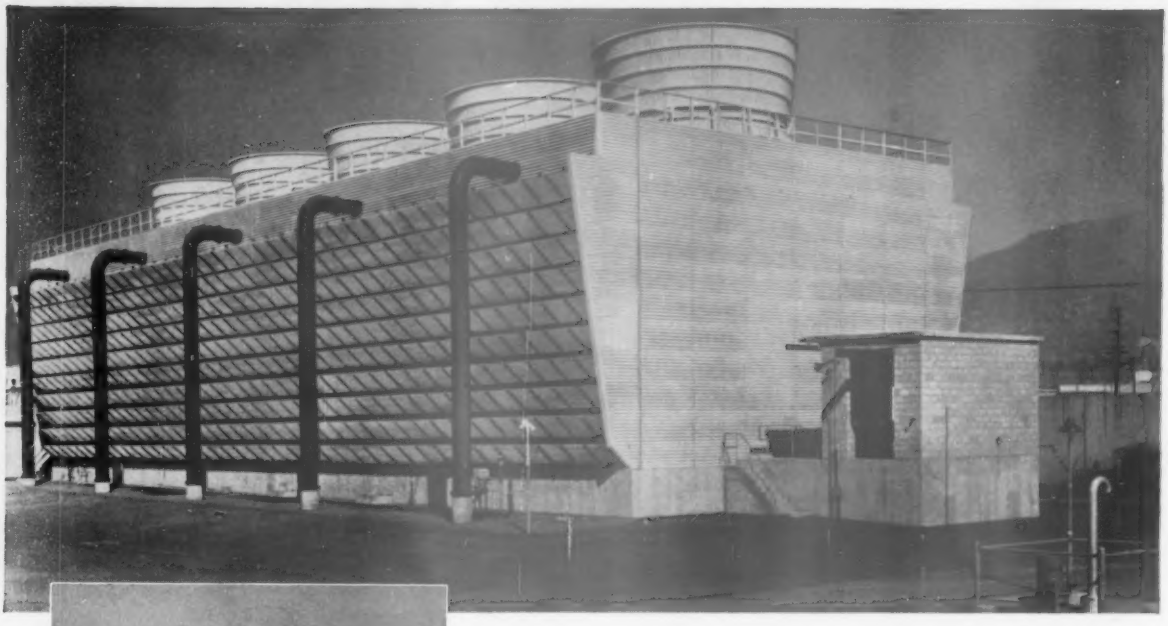

WAGNER® MOTORS HELP MARLEY TOWER

PRODUCE *MORE POWER* FOR BURBANK

At work on the fan deck: Five Wagner Type EP, 75 hp, 480 volts, 1750 RPM Motors.

This is the new Marley Class 600 Double-Flow 5-cell cooling tower at the power station of the City of Burbank, California ... the newest thing in cooling tower design. Its job: to cool water to get more kilowatts from steam.

Wherever water cooling is vital to plant capacity, product quality or customer comfort, chances are you'll find a Marley Cooling Tower. You'll probably find Wagner® Motors there, too. They're on this tower in Burbank, driving the huge fans used in the tower's cells.

The job is a rugged one. It calls for motors that can operate without attention month after month ... motors that can stand constant exposure to all kinds of weather and to high humidity, the number one cause of motor failure in cooling tower applications.

Wagner Type EP Motors meet these requirements. All vital parts of these workhorse motors are totally enclosed, and are sealed against moisture by a series of grease retaining grooves between shaft and housing. Running shaft seals, at both ends of the frame, prevent the entrance of water into the bearing housings. The frames, endplates and conduit box are made of heavy cast iron for extra protection against high humidity and corrosion.

What about your requirements for motor drives that must operate under adverse conditions? Versatile Wagner Totally-Enclosed Motors can meet them, whatever the application. They are available in standard ratings through 500 hp. Call your nearby Wagner Sales Engineer for full details, or write for Bulletins MU-224 and MU-230.

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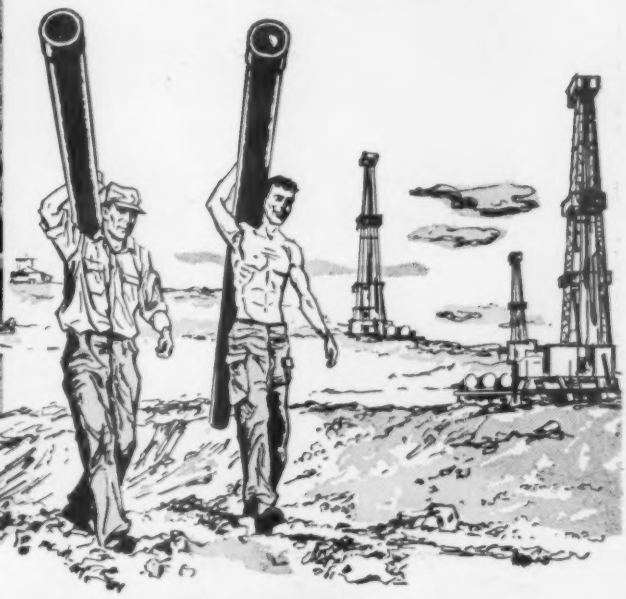
RIGID PIPE

made of **ABS** *Plastic*



RIGID PIPE OIL FIELD INSTALLATIONS OFFER NEW PROOF OF SUPERIORITY OVER CONVENTIONAL TYPE

BE *ABSolutely* SURE . . .
INSIST ON RIGID *ABS* PIPE
made of
CYCOLAC®
THE BORG-WARNER PLASTIC THAT IS TOUGH, HARD AND CORROSION-RESISTANT

- ★ Ideal for salt water tubing
- ★ For salt water disposal lines
- ★ For salt water gathering lines
- ★ For fresh water lines on leases
- ★ Carries sour crude safely
- ★ Handles all water flooding jobs

In Texas, Oklahoma, Kansas and Illinois—wherever oil is produced—ABS plastic pipe lines made of CYCOLAC are now on the job! Oil men have discovered that chemically-resistant, corrosion-free rigid ABS cuts both costs and man-hours. Rigid pipe is easily carried and quickly connected—two men can install over six miles in a day! Once installed, its smooth interior walls reduce friction and deliver more liquid, size for size.

Write for the name of your nearest supplier

MARBON CHEMICAL
WASHINGTON

MARBON CHEMICAL B-W BORG-WARNER

DIVISION **BORG-WARNER**
WEST VIRGINIA

KEEP MOVING . . . SWAMP

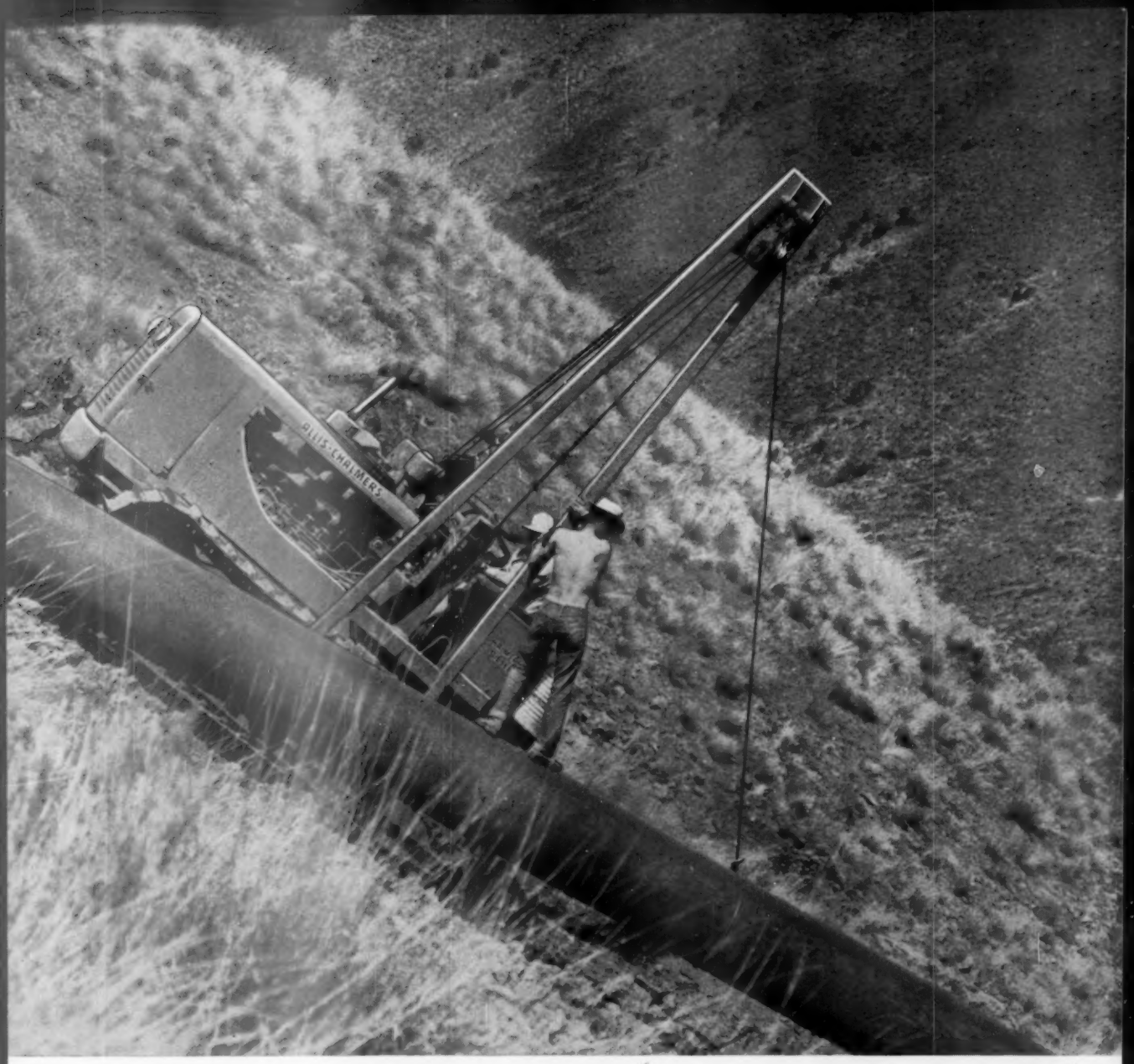
Sure-footed flotation saves you in soft going. Power and balance keep you rolling on steep slopes. All along the line you get money-making performance from Allis-Chalmers side boom tractors.

Allis-Chalmers' big side boom tractors have a *reputation* among pipeliners for walking right through gooey swamps that are out of bounds for other pipe layers. Long, wide tracks stay on top of mud. But it's more than just square inch of ground contact. Allis-Chalmers tractors have exactly the right combination of weight, center of gravity and clearance to stay afloat where other equipment bogs down.

They're agile climbers, too, with a combination of excellent balance and big power. From the 99-hp HD-11 to the 225-hp torque converter HD-21, Allis-Chalmers tractor engines have the deep-down lugability for steep hillside work.

Durability and safety are built in, too, with waterproof, internal-expanding side boom brakes . . . dropproof hydraulic counterweights . . . shock-absorbing,

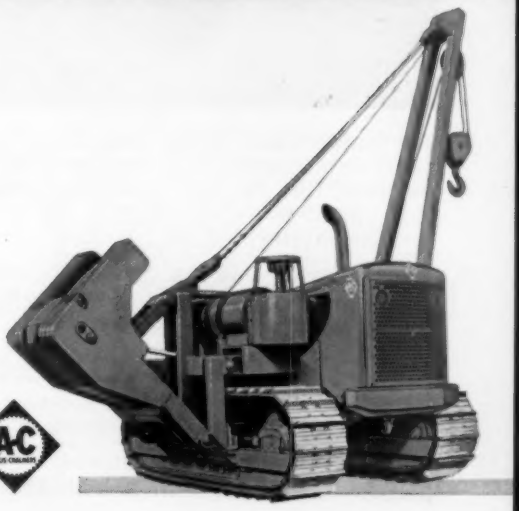
move ahead with



OR MOUNTAIN

all-steel tractor main frame . . . durable, double-reduction final drives . . . toughest track ever made. Certified permanent lubrication of tapered roller bearing truck wheels, idlers and support rollers eliminates greasing — saves time and cost.

Your Allis-Chalmers dealer will give you moneysaving proof why the 127,000-lb capacity HD-21, the 78,000-lb capacity HD-16, and the 40,000-lb capacity HD-11 are your best tractor buys — come swamps, mountains or biggest inch pipe. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.



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power for a growing world

360°

DISTRIBUTION OF SLURRY FROM THE CEMENTING SHOE GIVES THE BEST START TOWARD A SUCCESSFUL CEMENT JOB

LARKIN GEYSER SHOE

The Larkin Down Geyser Float Shoe is designed so that 60% of the slurry is discharged at a downward angle from the entire periphery of the shoe. This exclusive side-action provides perfect distribution of the slurry as it is discharged from the casing — the first step toward a successful cementing job.

When necessary, Geyser action will effectively jet out bridges or excessive filter cake from the well bore. Available . . . "Through Your Supply Store"

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They Say—

They liked booklet

Dear Sir:

As an oil industry employe I could not help but notice and be impressed with The Oil and Gas Journal's "first" in its August 1 edition, the "Why Is Gasoline Such a Bargain?" pamphlet (p. 138).

First of all, I think it is significant that the Journal's insert pamphlet has to do with a marketing problem primarily. Secondly, I think the pamphlet is excellent in that it has presented in such a small space so much valuable information on various industry topics.

I simply wanted to pass my personal reaction along and I would appreciate your adding my letter to what I hope will be a sizable reaction to the pamphlet.

Hunter L. Martin
Public Relations Representative
Humble Oil & Refining Co.,
Carter Division
Billings, Mont.

Dear Sir:

The booklet is further evidence of The Oil and Gas Journal's industry support and is much appreciated. We are trying to prepare similar messages for all the media at our command, and only hope we can do so well.

Kerryn King
Vice President
Texaco Inc.

Dear Sir:

The booklet should make a wonderful contribution to better understanding of oil industry problems.

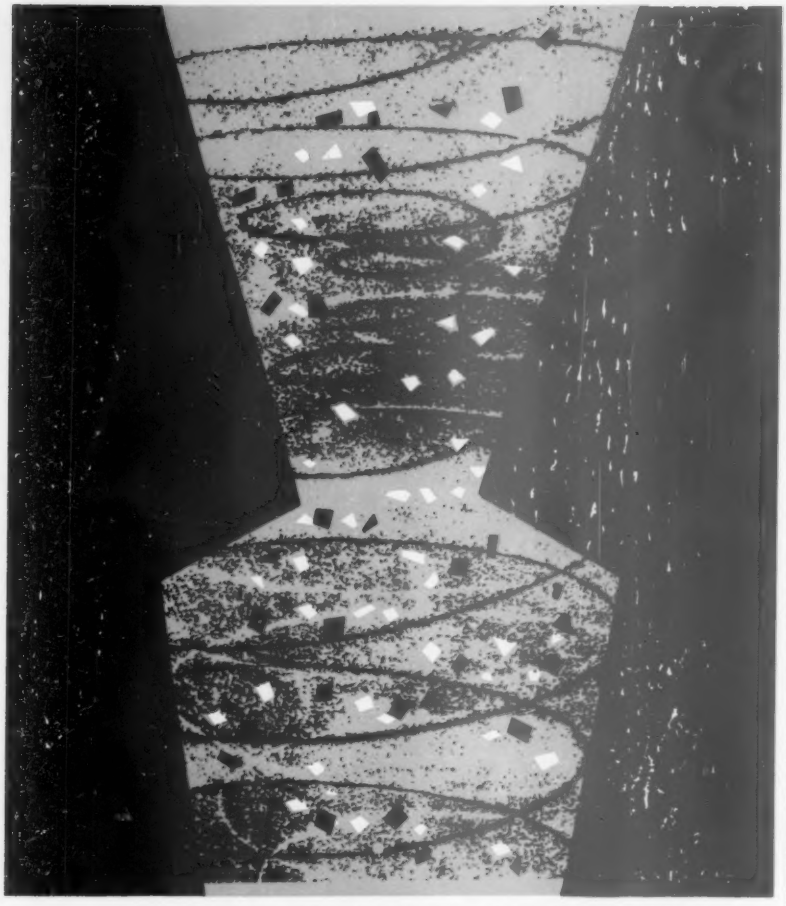
We plan to call the booklet to the attention of various people within the industry.

Daniel M. Doherty, Manager
Public Information Section
American Petroleum Institute

Dear Sir:

I believe The Oil and Gas Journal is to be commended on this effort. There are a great many organizations in the industry which have not been able to communicate to their own employes and stockholders the very good story we have to tell on gasoline prices and gasoline taxes.

These two subjects have been favorites of ours for the last few years,



KAISER LO-ERODE: HIGHEST RESISTANCE TO EROSION IN CYCLONES—TO 2400°F

Kaiser Lo-Erode high-purity, low-iron castable refractory is especially designed to resist the severe abrasive forces in refinery cyclones, lines, elbows, standpipes, and sugar-scoops.

It gives you the most effective, most economical abrasion resistance available in a refractory today.

In Lo-Erode, an extremely dense and hard aggregate is combined with a special binder. The result is superior strength and excellent erosion resistance within the service temperature range of catalytic units. Lo-Erode is ideal for use where highly abrasive particles or fluid solids are being handled at accelerated velocities.

For full details and installation procedures, call or write Kaiser Refractories & Chemicals Division, Kaiser Aluminum & Chemical Sales, Inc. at any of the Division Offices listed below:

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KAISER REFRACTORIES

Mexico Refractories Now Merged With Kaiser Refractories

and we have been hitting them hard on a fairly regular basis in our employe and shareholder publications.

One thought by ways of suggestion—our sharp-eyed counsel have suggested we steer clear of the word "control" when we are dealing with the concept of intensity of competition in a particular industry.

They point out, and quite rightly, that the number of competitors in an industry is not necessarily the best measure of the degree or intensity of competition to be found in an industry. An industry with only two competitors, for example, might have as intense a competitive nature as one with 22 competitors.

Don Sweeney, Manager
Public Relations Department
Socony Mobil Oil Co., Inc.

Dear Sir:

I think this is an effective and down-to-earth presentation of a difficult subject for the industry to get across. This, as you know, is a story that the industry needs to tell and retell.

I was interested to see our ton-mile story included in the material . . .

Christopher C. Vogel
Ethyl Corp.
New York.

Dear Sir:

I don't recall ever having seen any other business publication do what you are doing with your "Why Is Gasoline Such a Bargain?" booklet.

I should think both your readers and your advertisers would be most appreciative.

George C. Kiernan, President
Eastman Research Organization, Inc.
New York.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

AUGUST

22-26 Gordon Research Conference, catalysis, Colby Junior College, New London, N. H.

26 Southern Gas Association, transmission management fall conference, Shamrock Hilton Hotel, Houston.

29-31 Appalachian Gas Measurement Short Course, University of West Virginia, Morgantown, W. Va.

30-Sept. 2 American Association for the Advancement of Science, Alaska Division, eleventh Alaskan science conference, Anchorage.

SEPTEMBER

6-7 Chemical Institute of Canada, organic chemistry division conference, Edmonton.

7-9 American Society of Mechanical Engineers, joint automatic control con-

ference, Massachusetts Institute of Technology, Cambridge, Mass.

7-10 Billings Geological Society, annual field trip, Hebgen Lake-Madison Valley area of southwestern Montana.

8-9 National Research Council, Chemical Institute of Canada, tenth Canadian high polymer forum, Alpine Inn, Montreal.

8-9 Mid-Continent Oil and Gas Association, Louisiana - Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

8-10 Chemical Institute of Canada, western regional conference, Regina.

8-10 Intermountain Association of Petroleum Geologists and Eastern Nevada Geological Society, field trip, economic geology of east-central Nevada.

11-13 New Mexico Petroleum Industries Committee, annual convention, Western Skies Hotel, Albuquerque.

11-16 American Chemical Society, national meeting, New York City.

14-15 Western Petroleum Refiners Association, Rocky Mountain regional technical-industrial relations meeting, Henning Hotel, Casper, Wyo.

14-16 National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, N. J.

14-16 National Industrial Conference Board, eighth annual marketing conference, Waldorf-Astoria Hotel, New York.

15 Natural Gasoline Association of America, Rocky Mountain regional meeting, Palliser Hotel, Calgary.

15-16 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual engineering management conference, Morrison Hotel, Chicago.

16-17 Kansas Geological Society, twenty-fifth annual field conference, northeastern Oklahoma, Western Hills Lodge, Wagoner, Okla.

18-21 American Society of Mechanical Engineers, petroleum mechanical engineering conference, Jung Hotel, New Orleans.

19-21 Texas Mid-Continent Oil and Gas Association, annual meeting, Granada Hotel, San Antonio, Tex.

20-21 Illinois oil industry convention, sponsored by Illinois Oil and Gas Association, Illinois Oil Council, Illinois Petroleum Marketers Association, and Chicago Gasoline Jobbers Association, St. Nicholas Hotel, Springfield.

20-21 Ohio Petroleum Marketers Association, fall conference, Netherland-Hilton Hotel, Cincinnati.

21 American Petroleum Institute, Coalinga-Kettleman chapter, annual barbecue and golf tournament, Polvadero Country Club.

21-23 Pacific Coast Gas Association, annual meeting, Westward Ho Hotel, Phoenix.

25-27 American Association of Oilwell Drilling Contractors, annual meeting, Roosevelt Hotel, New Orleans.

25-28 American Institute of Chemical Engineers, meeting, Mayo Hotel, Tulsa.

25-28 American Institute of Electrical Engineers, petroleum industry committee, electrical conference of the petroleum industry, Hotel Skirvin, Oklahoma City.

26-29 American Welding Society, fall meeting, Penn-Sheraton Hotel, Pittsburgh.

26-30 Instrument Society of America, instrument-automation conference and exhibit, and fifteenth annual meeting, Coliseum, New York.

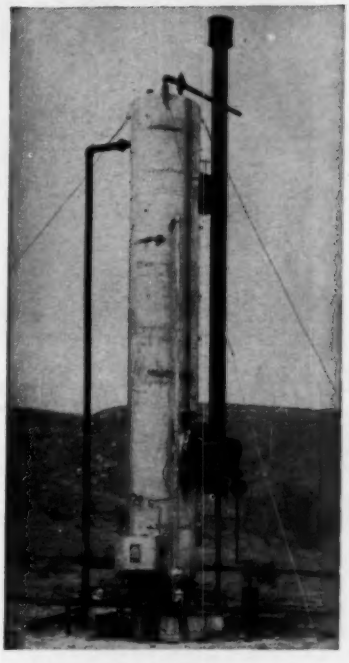
27-29 Mid-West Gas Association, annual school and conference, Memorial

METROL® Metering Treaters

METROL® Metering Treaters provide efficient separation of oil and water emulsions and accurately measure the oil and water in two integral metering chambers in the lower portion of the vessel.

Metering Treaters achieve greater economy by incorporating several functions into a single vessel. A Metering Treater will serve as an Oil and Gas Separator, a Free Water Knockout, an Emulsion Treater, and Oil and Water Meters. Thus, a Metering Treater can be used in place of several other separate pieces of equipment to obtain savings in equipment cost.

Free Water removal in the upper separating chamber on these Metering Treaters is an optional feature. Oil-Water Interface Control in these units is maintained by a Weir or by Float Operated Pilot and Valve.



METROL Model 36MT-0020 VWK Metering Treater

METROL Metering Treaters are equipped with high capacity heating tubes that eliminate "hot-spots" and thus prevent fire tube failures. Also, these units are equipped with trouble-free and safe combustion control equipment to prevent "Blow-outs" and "Flashback."

Emulsions in most areas can be treated by these units without excelsior. However, excelsior can be furnished in these Metering Treaters in case it is needed or wanted.

METROL's design experience, combined with qualified field service, assures the producer of dependable and trouble-free operation.

METROL Metering Treaters are available in either vertical or horizontal type of construction, and in working pressures of 25, 50, and 100 psi.

If you have an Emulsion Treating problem where you wish to meter the oil and water, you will save money by using METROL Metering Treaters. Please write us for details.

SPECIFICATIONS AND CAPACITIES

Outside Diameter	Shell Length	Heating Capacity BTU/Hr	Working Pressure psi	Capacities
3'	20'—0"	200,000	25, 50, & 100	Settling and metering capacities for these units will be furnished upon request
4'	20'—0"	400,000	25, 50, & 100	
6'	20'—0"	600,000	25, 50, & 100	
8'	22'—0"	1,200,000	25, and 50	
10'	22'—0"	1,800,000	25, and 50	

Every Unit is completely assembled, pressure tested, calibrated, and performance tested before shipment.

Competent Sales and Service Representatives located in all major producing areas.

*Pat. No. 2,818,738

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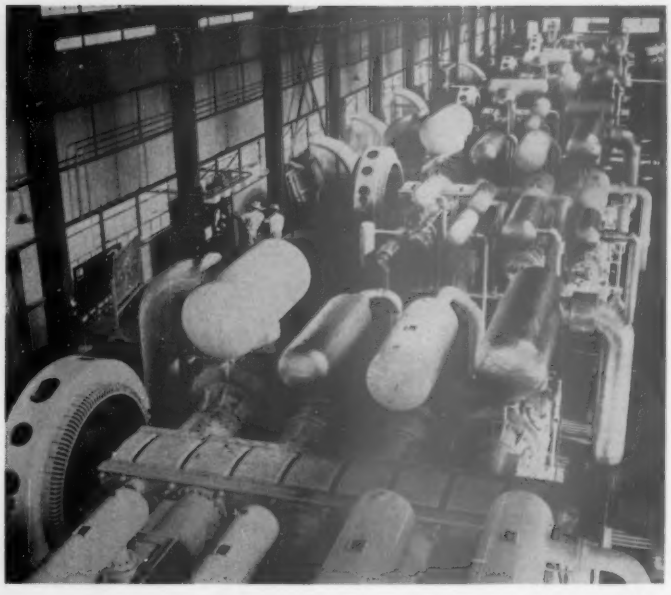


Petroleum Chemicals, Inc., Installs 98 Burgess-Manning Snubbers To Prevent Pulsation Damage In New Ammonia Plant

Foster Wheeler Corporation was contracted by Petroleum Chemicals, Inc., to design and construct a multi-million dollar ammonia process plant at Lake Charles.

Realizing that gas pulsation would cause severe operating problems in the multi-service process piping related to reciprocating compressors, and that hazardous pulsation should be engineered out of the plant in the initial design, Foster Wheeler called upon Burgess-Manning Company to develop pulsation snubbers for various service conditions and for installation under the original contract.

Ninety-eight pulsation snubbers of 46 individual designs were installed on multi-stage, multi-service compressors. The snubbers were installed on both the suction and discharge sides of the compressor cylinders in what is believed to be *the largest single installation of pulsation snubbers under one roof.*

The compressors handle various types of gases, ranging in molecular weight from 5.13 to 33, at pressures from atmospheric to 9,270 P.S.I.A.; and at discharge temperatures to 350° F. Under these exacting conditions, Burgess-Manning accepted the responsibility to engineer and supply pulsation snubbers of optimum design that would: *1. Hold the pulse amplitude to 2 per cent or less, total surge peak-to-peak, of absolute line pressure, and 2. hold a minimum pressure drop requirement.*

The snubbers were subjected to the stringent specifications of material, workmanship, and inspection procedures normally followed by Foster Wheeler in process plants of this type. All forged snubbers for high-pressure service were made of high tensile alloy steel. Internal assemblies were engineered to withstand extreme forces.

After the plant went on stream, operational inspection revealed minimum pulsation-induced vibration, eliminating operating hazards, constant maintenance, and upkeep of the laterals, headers, intercoolers, and separators attendant to the snubbers.

If you are planning a new plant, or have a pulsation problem in your present plant, it will pay you to consult Burgess-Manning — "The Sound Engineering People." There's no obligation, of course.

Industrial Silencer Division
BURGESS-MANNING COMPANY
The Sound Engineering People 9241 SOVEREIGN ROW • DALLAS 7
Sales Engineering Representatives Coast to Coast

Union, Iowa State College, Ames.

29-30 Mid-Continent Oil and Gas Association, Mississippi - Alabama division meeting, Grand Hotel, Point Clear, Ala.

29-Oct. 1 West Texas Geological Society, field trip, Delaware Basin of West Texas and southeast New Mexico.

OCTOBER

2-5 Society of Petroleum Engineers of AIME, annual fall meeting, Denver.

3-4 Independent Natural Gas Association of America, annual meeting, Fontainebleau Hotel, Miami Beach.

4-5 University of Kansas, gas-measurement institute, National Guard Armory, Liberal, Kans.

5 Society of Plastics Engineers, Inc., regional technical conference, Mark Hopkins Hotel, San Francisco.

6-7 National Association of Corrosion Engineers, annual western region conference, Sheraton - Palace Hotel, San Francisco.

6-8 National Association of Corrosion Engineers, southeast region conference, Dinkler-Plaza Hotel, Atlanta, Ga.

6-8 National Academy of Sciences, National Research Council, ninth national clay conference, Purdue University, Lafayette, Ind.

10-12 American Gas Association, annual convention, Atlantic City.

11-14 National Association of Corrosion Engineers, northeast region conference, Prichard Hotel, Huntington, W. Va.

12-14 Southwestern Federation of Geological Societies, annual meeting, Wooten Hotel, Abilene, Tex.

13-14 California Natural Gasoline Association, annual fall meeting, Hotel Miramar, Santa Monica, Calif.

13-16 Taft, Calif., Oildorado, fiftieth anniversary celebration.

14-15 University of Texas, E. P. Schoch lecture series on rate processes, Batts Hall Auditorium, Austin.

14-16 New Mexico Geological Society, annual field conference, Chama basin of northern New Mexico, registration, Taos, Oct. 13.

17-19 American Society of Mechanical Engineers, American Society of Lubrication Engineers, lubrication conference, Statler Hilton Hotel, Boston.

17-19 University of Minnesota, Pennsylvania State University, Colorado School of Mines, biannual symposium on drilling and blasting, Golden, Colo.

19-20 National Association of Corrosion Engineers, north central region conference, Schroeder Hotel, Milwaukee.

19-21 Gulf Coast Association of Geological Societies, convention, Biloxi, Miss.

19-21 Rocky Mountain Oil and Gas Association, annual convention, Brown Palace Hotel, Denver.

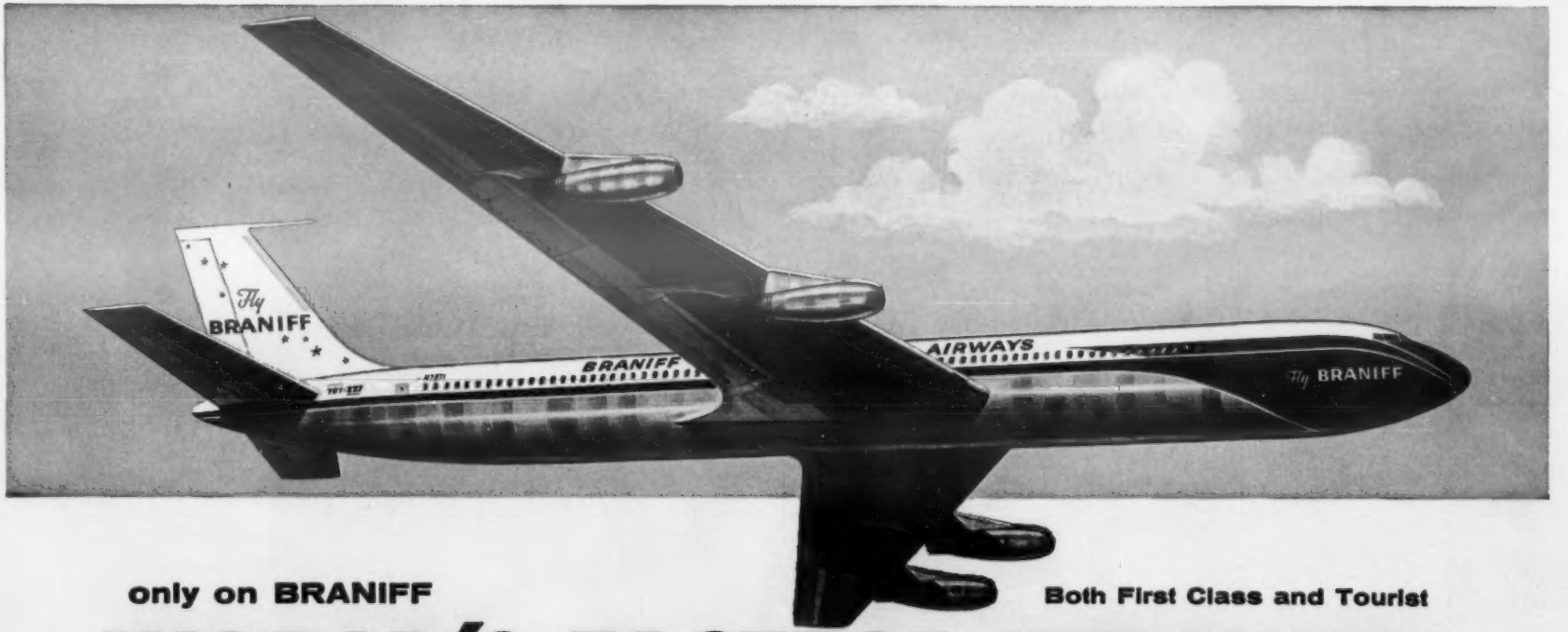
20-21 American Institute of Mining, Metallurgical, and Petroleum Engineers, Los Angeles Basin, fall meeting, Huntington Sheraton Hotel, Pasadena, Calif.

20-23 Permian Basin Oil Show, Odessa, Tex.

23-25 Independent Petroleum Association of America, annual meeting, Statler-Hilton Hotel, Dallas.

24-25 American Society of Mechanical Engineers, American Institute of Electrical Engineers, fuels conference, Daniel Boone Hotel, Charleston, W. Va.

25-28 National Association of Corrosion Engineers, south central region conference, Mayo Hotel, Tulsa.



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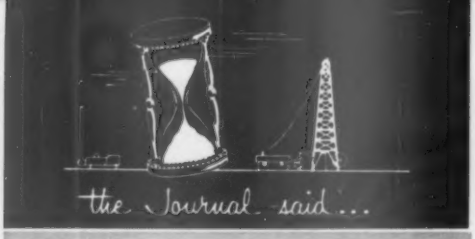


50 years ago

August 25, 1910

The Oil and Gas Journal moves its publication office from Tulsa to St. Louis where more adequate printing facilities are available and a more central location provided for distribution of the publication to all parts of the country. H. L. Wood, president and editor, will continue to live and maintain an office in Tulsa to cover Mid-Continent fields. W. D. O'Neil, business manager, will headquarter in the Missouri city.

The Oil Men's Association at its annual outing at Conneaut Lake, Pa., launches campaign for funds to establish and maintain a home for aged oil men. Committee recommends acceptance of offer by J. C. McKinney to donate 100-acre site near Titusville, Pa., and his stock in the nearby Fieldmore hotel.

25 years ago

August 22, 1935

Speakers at annual meeting of American Chemical Society predict acute shortage of petroleum in the United States within a few years. Shortage, they warn, will swell imports, boost prices of motor fuel, and force more general use of small, low-powered cars.

Revived and expanded oil development in West Texas and Southeast New Mexico leads Humble Oil & Refining Co. to move division offices from McCamey to Midland. Included in move are R. C. Barbour, superintendent; J. W. House, assistant superintendent; Ben Carsey, geologist; and R. S. Dewey, petroleum engineer.

First of newly developed diesel-powered direct-current generator units for drilling rigs are placed in operation in Lucien field, in Noble County, Oklahoma. Stiff competition for steam-powered rigs predicted.

10 years ago

August 24, 1950

Modern operating techniques bring new life to oil activities of Oklahoma's fabulous Osage, once the embodiment of the "get rich quick" oil rush of the 1920's. New lease auction of 52,536 acres for $194,800 switches activity focus from west to east side of county.

Humble Oil & Refining Co. rotary rig operating near Natchez, Miss., sets new fast-drilling record of 2,448 ft. of hole in one 8-hour tour.

Daily average crude runs by United States refineries last week set a new all-time record of 6,0[illegible]1,000 bbl., passing the 6,000,000-bbl. mark for the first time. They exceeded the previous week's average by 100,000 bbl., and were 817,000 bbl. above runs a year ago.

JOURNALLY SPEAKING

Soviet Self-Service

AMERICAN oil executives now touring Russia should bug their eyes at the opportunities for U. S.-style gasoline marketing: 8,000,000 sq. miles of undeveloped, noncompetitive service-station territory with high retail prices guaranteed.

And if their stories of Soviet lack of solicitousness for motorists sounds like capitalist propaganda, here are some corrobrating reports from the Russian press.

Moscow News, in announcing that foreign tourists may now rent a car or drive their own over five of the busiest highways in the Soviet Union, declares with obvious pride:

"There are filling stations every 100 or 150 kilometers (62-93 miles) and technical service stations (garages) every 200-300 kilometers (124-186 miles)." The Russian newspaper adds that tourists can buy tickets at a special rate enabling them to obtain 60-octane gasoline for 28 cents a gallon, 74-octane gasoline for 43½ cents, or 93-octane gasoline for 55 cents.

First American to take advantage of Russia's "Drive-Yourself" arrangement recently wrote of her experiences in the Soviet press. Mrs. Rita Rentschler, wife of a U. S. industrialist, described the portion of her trip from Leningrad to Kalinin in a Russian-made "Volga" automobile as follows:

"I left Leningrad at 11 in the morning, and all went well until I had gone about 20 kilometers past Novgorod. Then I noticed that the car seemed hot, and the water gage showed that something was wrong. I knew that the next gas station was a good 100 kilometers away, so there was nothing to do but go back to Novgorod to the gas station there.

"How surprised I was when the station attendants told me they had no water for cars—nor was there a mechanic at the station. They sent me to an auto repair station, but that was closed because it was Sunday. So I went back to the gas station and asked where else I might find water. 'Perhaps in the villages,' they replied. I wondered if they expected me to buy a bucket and fill it at the village pump.

"In despair I started off again... Suddenly a sentry stand appeared by the roadside. When I explained my predicament, the policeman opened the hood, found what was wrong, and from nowhere produced a bucket of water."

Mrs. Rentschler's troubles on the Leningrad-Moscow highway were nothing compared to the everyday woes experienced by the comparatively few Russian car owners. The official Soviet government newspaper Izvestia recently published this story from the city of Frunze (population 217,000) under the caption FILL UP THE GAS TANK, BROTHER:

"Several little Moskovich and Volga cars stood near the entrance to the city. Owners of these automobiles crowded together on the road and argued hotly about something. But then a truck appeared up ahead, and everyone, as if by command, raised his hand.

" 'What's wrong?' the truck driver asked.

" 'You know well enough! Fill the gas tank, brother.'

"The truck driver nodded his head understandingly and pulled to the side of the road. He put a rubber hose into the truck's gas tank, and for a long time a little yellow fountain of gasoline streamed into buckets and canisters. The car owners eagerly thrust coins at the truck driver and ingratiatingly patted him on the shoulder.

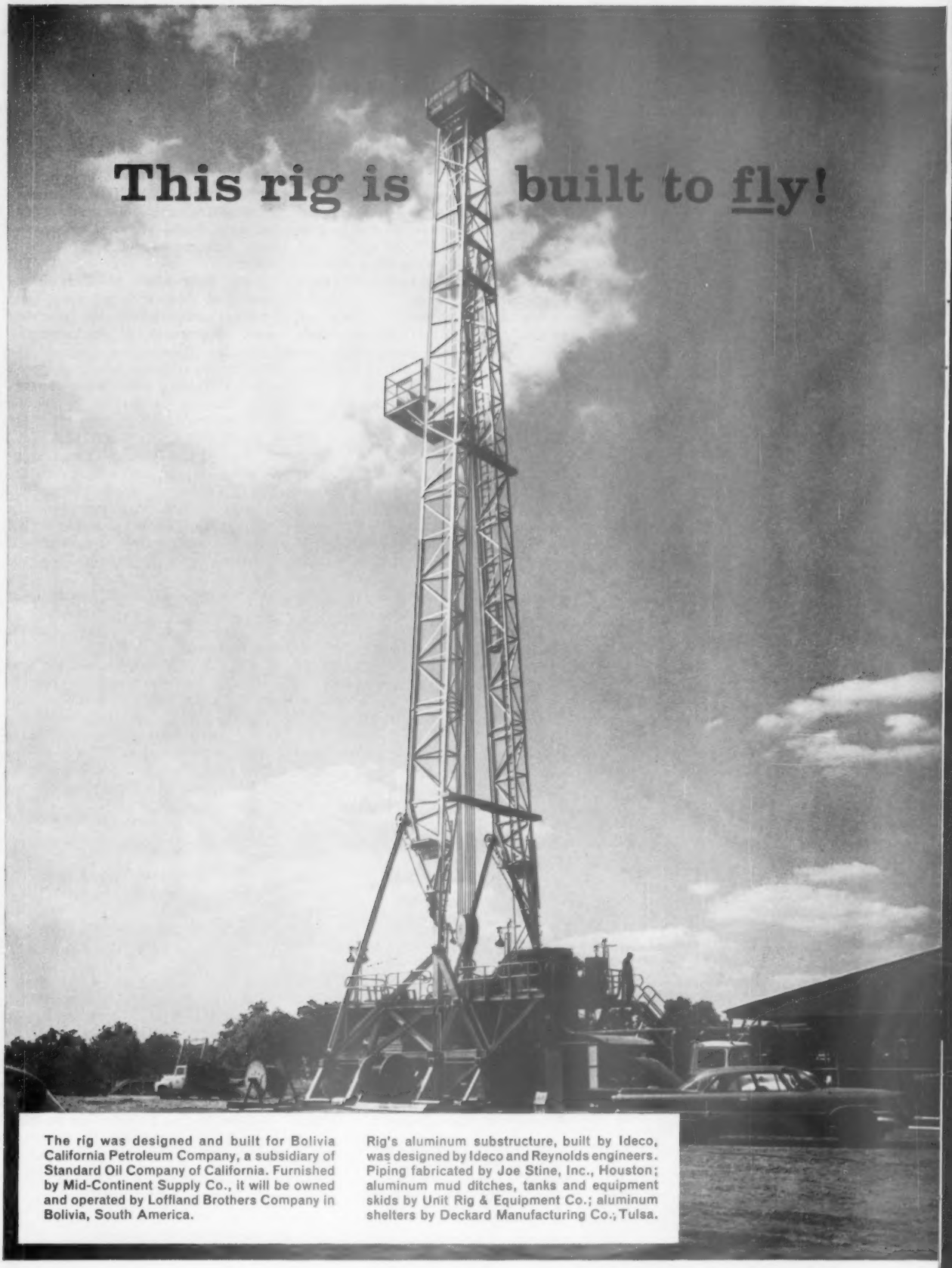
" 'Thanks, brother, you've rescued us.'

"You can see such scenes every day on every road. The police and Young Communist patrols pay no attention to them. There are no gas pumps for private car owners.

"The city of Frunze has 1,400 private automobiles and 1,500 motorcycles. But there isn't even one service station. Do private cars stand idle? Nothing of the sort.

"Gasoline is bought on the side, and the government takes a double loss. Only 5-6 metric tons of gasoline are sold per month. Private car owners get the rest of their fuel by illegal means. The same situation prevails in many cities of the Kirghiz Republic."

—*Henry D. Ralph.*



The rig was designed and built for Bolivia California Petroleum Company, a subsidiary of Standard Oil Company of California. Furnished by Mid-Continent Supply Co., it will be owned and operated by Loffland Brothers Company in Bolivia, South America.

Rig's aluminum substructure, built by Ideco, was designed by Ideco and Reynolds engineers. Piping fabricated by Joe Stine, Inc., Houston; aluminum mud ditches, tanks and equipment skids by Unit Rig & Equipment Co.; aluminum shelters by Deckard Manufacturing Co., Tulsa.

...made with strong, lightweight Reynolds Aluminum

The rig shown opposite is light enough to *fly*—and it will, by cargo plane or helicopter, to remote drilling sites in South America.

Light as it is, it can handle a 350,000 lb. hook load with a concurrent pipe setback load of 150,000 lbs. This new rig has a depth capacity of 15,000 ft. with 3½" drill pipe.

Explanation: Except for the mast, the major components of the rig are made with strong, lightweight Reynolds Aluminum. Reynolds supplied the aluminum and worked closely with the fabricators in designing this equipment.

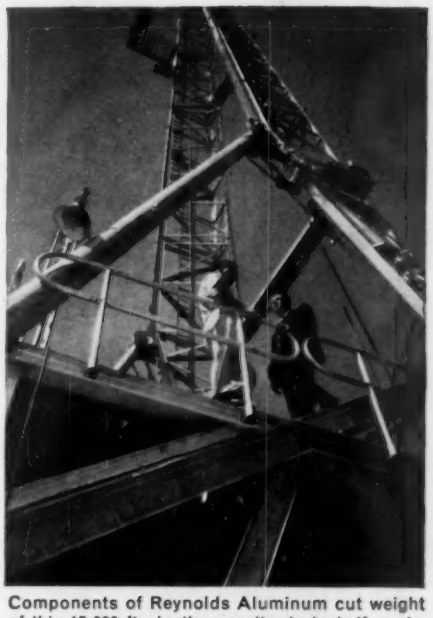
The aluminum sub-structure, which saves 60% of the weight of an equivalent steel base, was designed by Ideco in close cooperation with Reynolds engineers. The crow's nest, handrails, finger board, racking platforms, and water and mud suction lines are also made of Reynolds Aluminum. Unit Rig & Equipment Co. fabricated the aluminum mud ditches, tanks, and equipment skids.

Thanks to its extensive use of Reynolds Aluminum and other special design features, the rig weighs less than 400,000 lbs.—about half as much as an equal conventional rig. This makes it practical for exploration teams to fly the rig in sections to drilling sites wherever they can land a cargo plane or helicopter.

And the Reynolds Aluminum in the rig will serve longer, with less maintenance, than steel. Aluminum resists corrosion from drilling muds; it won't rust.

The lightweight strength and corrosion resistance that Reynolds Aluminum adds to the air-borne drilling rig are paying important dividends throughout the petroleum industry—in drilling, refining, transportation, and marketing. And you can get immediate service, experienced technical assistance—as well as metal—from Reynolds.

For details on the new rig or on any use of aluminum, contact your local Reynolds office, or write *Reynolds Metals Company, Richmond 18, Virginia.*



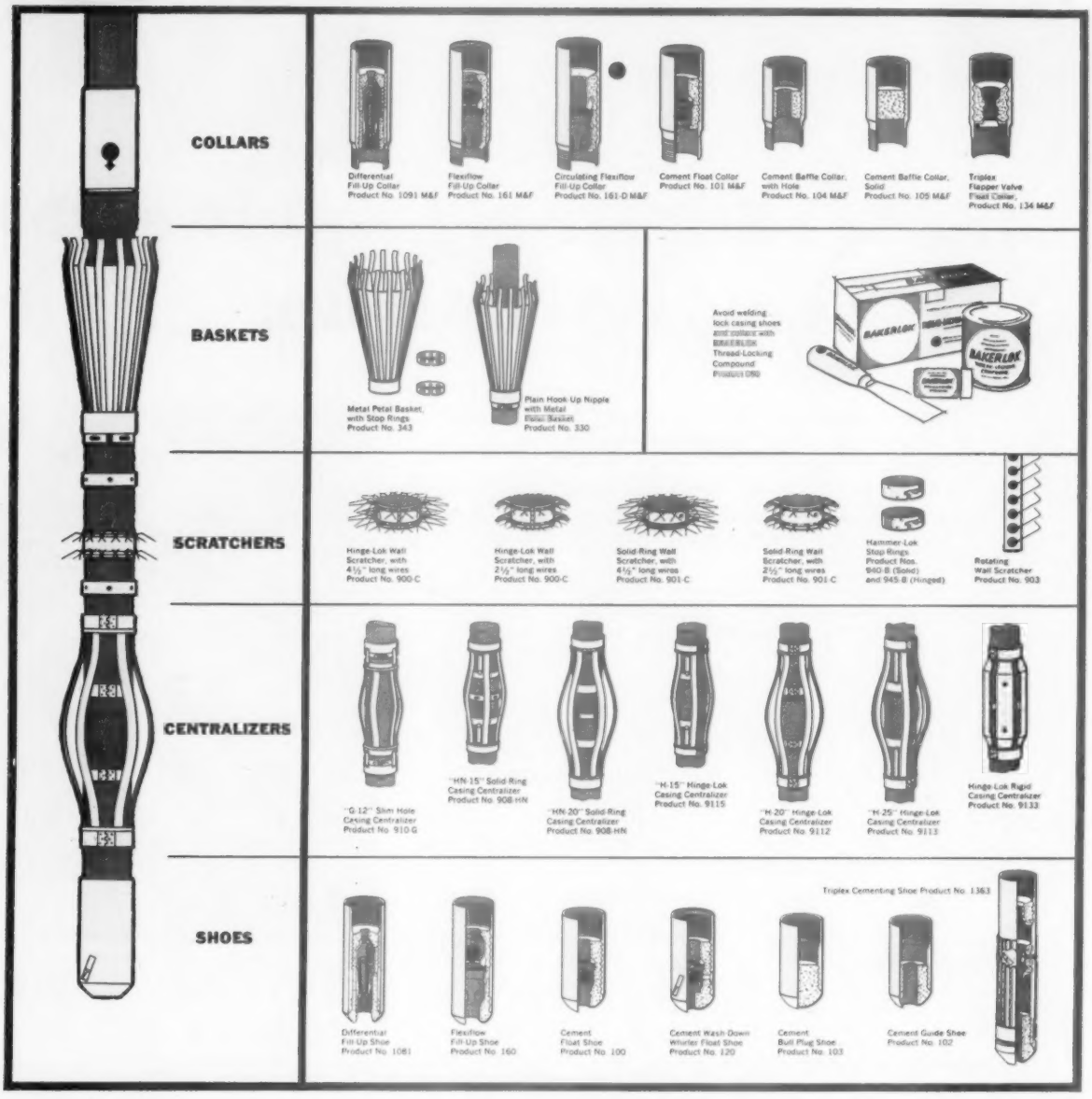
Components of Reynolds Aluminum cut weight of this 15,000 ft. depth capacity rig in half, make it suitable for air transport to remote drill sites.

Note to Oil Field Equipment Manufacturers:

Initial material cost doesn't fully determine product end cost. Aluminum's light weight, ease of fabrication, and corrosion resistance often mean lower final costs. Contact the leader in developing aluminum applications for the oil industry—Reynolds. Call the Reynolds office nearest you or write *Reynolds Metals Company, P.O. Box 2346-CR, Richmond 18, Va.*

REYNOLDS ALUMINUM

Watch Reynolds TV shows: "Bourbon Street Beat" and "Adventures in Paradise"; and, resuming in October, "All Star Golf"—ABC-TV.


COLLARS
Differential Fill-Up Collar Product No. 1091 M&F
Flexiflow Fill-Up Collar Product No. 161 M&F
Circulating Flexiflow Fill-Up Collar Product No. 161-D M&F
Cement Float Collar Product No. 101 M&F
Cement Baffle Collar, with Hole Product No. 104 M&F
Cement Baffle Collar, Solid Product No. 105 M&F
Triplex Flapper Valve Float Collar, Product No. 134 M&F
BASKETS
Metal Petal Basket, with Stop Rings Product No. 343
Plain Hook-Up Nipple with Metal Petal Basket Product No. 330
Avoid welding: lock casing shoes and collars with BAKERLOK Thread-Locking Compound Product 060
BAKERLOK
SCRATCHERS
Hinge-Lok Wall Scratcher, with 4½" long wires Product No. 900-C
Hinge-Lok Wall Scratcher, with 2½" long wires Product No. 900-C
Solid-Ring Wall Scratcher, with 4½" long wires Product No. 901-C
Solid-Ring Wall Scratcher, with 2½" long wires Product No. 901-C
Hammer-Lok Stop Rings Product Nos. 940-B (Solid) and 945-B (Hinged)
Rotating Wall Scratcher Product No. 903
CENTRALIZERS
"G-12" Slim Hole Casing Centralizer Product No. 910-G
"HN-15" Solid-Ring Casing Centralizer Product No. 908-HN
"HN-20" Solid-Ring Casing Centralizer Product No. 908-HN
"H-15" Hinge-Lok Casing Centralizer Product No. 9115
"H-20" Hinge-Lok Casing Centralizer Product No. 9112
"H-25" Hinge-Lok Casing Centralizer Product No. 9113
Hinge-Lok Rigid Casing Centralizer Product No. 9133
SHOES
Triplex Cementing Shoe Product No. 1363
Differential Fill-Up Shoe Product No. 1081
Flexiflow Fill-Up Shoe Product No. 160
Cement Float Shoe Product No. 100
Cement Wash-Down Whirler Float Shoe Product No. 120
Cement Bull Plug Shoe Product No. 103
Cement Guide Shoe Product No. 102

Good primary cementing equipment makes sense

THERE ARE TWO WAYS to buy primary cementing equipment—by quality and by price. Both are important.

Still, some operators don't shop for quality. They feel that primary cementing is a more or less routine operation. So any shoes, collars, centralizers, scratchers, baskets are good enough.

IN OUR OPINION (and plenty of operators agree), primary cementing is never routine. You've got just one chance to get a good primary cement job. So it makes plain good sense to invest in the most advanced equipment you can get.

Any remedial operation that comes later not only comes at high extra cost—it is never as satisfactory as a primary cement job that's done right in the first place.

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How to "undrill" needless wells

IN A PUBLIC SPEECH a couple of years ago, Gen. Ernest O. Thompson, chairman of the Texas Railroad Commission, explained that the Middle East has relatively few oil wells but their potentials are from 1,000 to 10,000 bbl. per day, whereas the United States has many times the wells but our average production is about 13 bbl. per day.

He then voiced a question that has long been in the minds of all U. S. producers: "How can 13-bbl. wells compete with 1,000-bbl. wells?"

ANSWERS TO THIS QUESTION are now being sought diligently by many producers. Some of the proposals may jar traditional ways of operating, but they all should be studied with an open mind because the question posed by General Thompson is a matter of life and death to the domestic industry.

The obvious answer is: Produce more per well from fewer wells. This is easier said than done because of the laws, customs, and contracts surrounding production. But it is not impossible.

A good start in this direction is the agitation for wider well spacing that is now being carried on in many areas. An increasing number of operators—and state regulatory commissions—are coming around to the view that it doesn't make much sense to drill more wells than the minimum needed to drain a field effectively.

In new fields, wider initial spacing can do much toward solving the problem of increasing the average output per well. "But," oil men are prone to say with an air of finality, "you can't undrill wells in an old field."

An ingenious substitute for "undrilling" a field is now being proposed for East Texas (see page 44). That is to shut in perhaps 50 to 80% of the wells and transfer their allowables to the remainder. The field's total production would remain unchanged but the cost per barrel would be lower because fewer wells would need to be maintained and serviced.

This is an idea that might have application in many fields throughout the United States where the physical characteristics of the reservoir warrant it. Two substantial operators in East Texas field have proposed different formulas for achieving the same general objective, and many other variants may need to be devised to suit local conditions. But it is an idea well worth objective study.

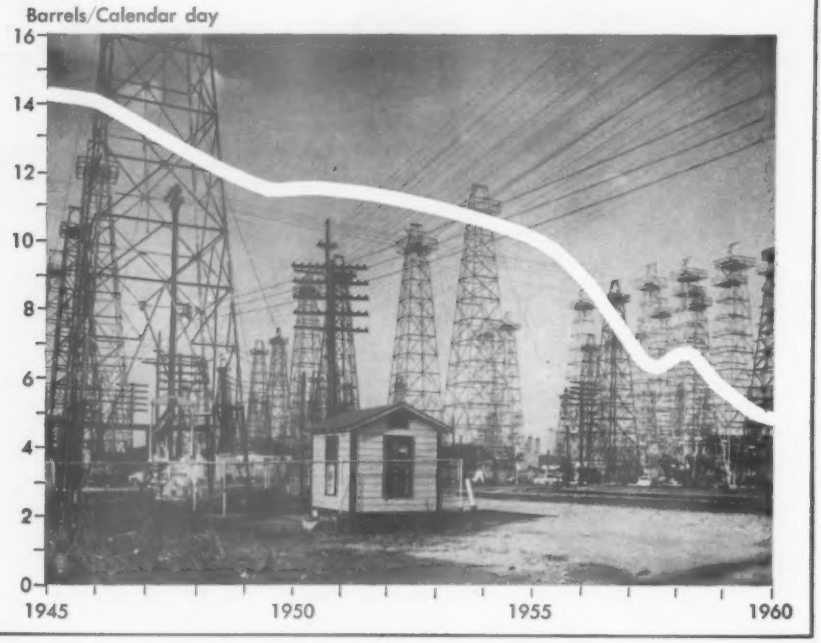
IT IS NOW CLEAR that the demand for crude oil in this country will not increase rapidly in the next few years. Nor can imports be pushed back much further.

So the problem is how to divide the producing pie. Shall it be a multitude of tiny crumbs; or a fewer number of respectable slices?

The cure for low allowables per well is fewer wells per allowable.

How Allowables Have Dropped in East Texas Field

Average production of prorated wells is down to just over 5 bbl. per calendar day.



New Cost-Cutting Idea Advanced

• Changes proposed in East Texas field would mean producing the same amount of oil from fewer wells. Atlantic says its plan to transfer the allowables of eight wells to a single well would save operators $5 million a year.

Robert J. Enright
District Editor

DOMESTIC oil producers—already doing about all they can to cut development costs in new fields—are beginning to focus cost-saving efforts on old, narrow-spaced pools.

Prime targets are fields with 5, 10, and 20-acre spacing. Here operators feel they can save a potful of money. They would do it by producing the same amount of oil through fewer wells, thereby whacking operating costs while maintaining income.

Producers hope to achieve these operating-cost economies mainly either by consolidating small proration units into larger ones or by transferring allowables of a number of wells on a lease to just one well and shutting in the others.

To do either, producers for the most part will have to gain approval of state regulatory agencies. Rules changes would be involved. Such changes in the past have normally been made hinging on whether they would prevent waste.

The proposed cost-cutting routes would neither cause waste nor prevent it in the normal sense. But producers hope to convince regulatory bodies that "economic" waste is taking place—that money that should be spent elsewhere to some good purpose is going down the drain with nothing to show for it.

East Texas drive on . . . Some of the nation's biggest, oldest, and most prolific oil pools will be targets in this cost-cutting drive in coming months.

And this includes the colossus of American fields, East Texas field itself.

The East Texas move is already under way. It has strong support from majors and independents alike.

On September 20, the Texas Railroad Commission will hear concrete proposals from Tidewater Oil Co. and Atlantic Refining Co.—probably others, too—for changes in East Texas rules which would permit widespread transfers of allowables.

The rules changes would affect prorated wells only. And they would result in the shutting in of many of the field's 19,262 wells (16,150 of them prorated) and the production of the same volume of oil from the remainder.

With only 8 producing days in Texas and the likelihood of considerably more of the same, producers

claim the situation in East Texas has degenerated to the point of being ridiculous.

There are thousands of wells in East Texas with the capacity to produce several thousand barrels a day each. Special field rules give them a producing-day allowable of 2.32% of their hourly potentials. These potentials are regarded in the industry as being realistic in that they were witnessed by Railroad Commission personnel.

Thus, a well with a potential of 1,000 bbl. an hour gets an allowable of 23.2 bbl. per producing day. With only 8 producing days, however, this permits the well to produce only 185.6 bbl. of oil a month—or only 6.2 bbl. per calendar day during a 30-day month.

Even the marginal East Texas field well gets to produce much more than this. Texas' marginal-well statute exempts the East Texas field marginal well from shutdown days if it is unable to produce more than 20 bbl. a day under test. This well then in a 30-day month can produce up to 600 bbl. of oil—for an average of 20 bbl. per calendar day.

Thus, a marginal well in the field—one that is on its last legs—may now produce three times as much as the most prolific, top-allowable well in the field (OGJ, Jan. 25, p. 125).

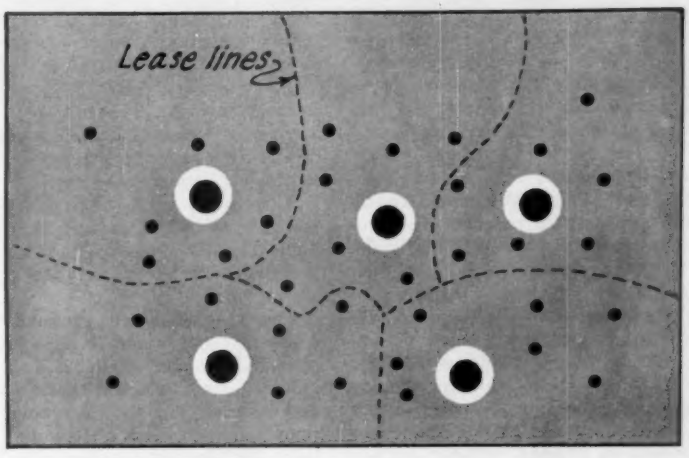
Operating costs in East Texas field in most cases are relatively low in comparison with those in some other fields. But even so, operators complain, 6 bbl. a day is extremely low. Production at such a level has cut profit margins to the very bone. Producers can't walk off and leave reserves such as those in East Texas field. But here is an absurd situation where companies have wells capable of making thousands of barrels a day each but are actually threatened with losing money in producing those wells.

East Texas operators are quick to point out that they're not asking for higher allowables. They are seeking approval of some formula which would permit them to use fewer wells to produce the present scant field allowable for prorated wells.

Six minutes a day . . . An engineer for one East Texas producer points to a field practice which illustrates the absurdity of the prorated-well picture in the giant pool.

A common procedure, he says, is to fit an East Texas field well with a small-size choke which will permit it to produce 1 bbl. a minute. The pumper then can open the well and, by checking his watch, easily keep track of when the well has made its allowable.

Some East Texas operators produce their wells every day of the month.

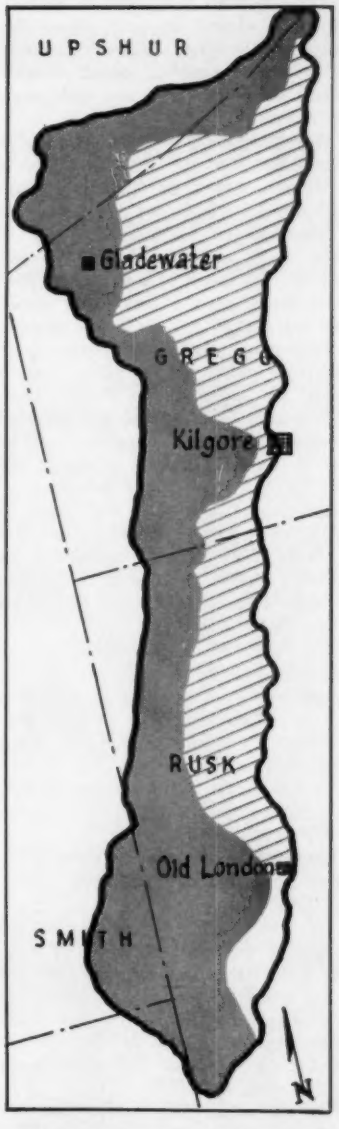


Here's How Atlantic's Plan Works

ONLY one out of every eight wells would be produced under Atlantic's proposal.

The top map shows a hypothetical East Texas tract with 40 wells. Five of the wells would remain on production; the remaining 35 would be shut in.

The bulk of the prorated wells which would be affected by Atlantic's proposal are in the eastern portion of the field (striped area on map at right). Water encroachment in much of the western area of the field would eliminate many wells in this area from the proposal.



The pumper in such a case goes to a top-allowable well (with a 20-well allowable, for instance), opens the valve for 5 minutes and 20 seconds, shuts the valve and the well has made its daily allowable. He repeats the procedure at the next well.

What is proposed . . . So far Tidewater and Atlantic have made known their proposals for reducing the number of producing wells in the field. Others are certain to present their ideas at the September 20 hearing.

Tidewater, the first company to broach a proposal, will ask the commission to permit field operators to divide their leases into production units not exceeding 44 acres. Shape of the units would be conditioned by a maximum diagonal between any two extremities of 2,100 ft.

Prorated wells in any unit so formed could be closed in and allowables transferred to other wells on the same unit. No well, however, could produce more than 600 bbl. in any one calendar month.

Marginal wells could not transfer allowables.

Atlantic would go further. It suggests that an operator be permitted to transfer the allowables of up to seven wells to an eighth. It would thus shut in seven of every eight prorated wells in the field that could take advantage of the rules change.

This plan, with East Texas spacing principally on 5 acres, would create an approximate 40-acre unit. A provision limiting distance between producing well and transferee well to 950 ft. would result in a rough 40-acre circle. This would remove any temptation to choose a well close to a neighboring lease line as the producing well. With such a restriction, an operator would be unable to include all eight wells on his lease if he picked a well close to the line.

The amount of allowable to be transferred from a well would not exceed the producing capacity of that well as determined by a 24-hour production test prior to transfer. And, subsequent to such test, the shut-in wells would be exempt from further tests unless and until the producing well should produce water.

No well making more than 25% water could accept allowable transfers from other wells.

Tidewater's plan would give to the producing well the maximum production now permitted a marginal well in the field—20 bbl. per calendar day. This would mean roughly that each producing well would get its own allowable plus that of 2.2 other wells on the same lease.

The Atlantic plan would give the producing well eight allowables. This would give it a total allowable of about 49½ bbl. a calendar day—assuming a daily allowable average for the eight wells currently of 6.2 bbl.

Terrific savings . . . Atlantic has worked up figures showing its cost of producing a prorated well in the field at about $50 a month.

A company spokesman points out that, of the 19,262 wells in the field, there are 3,113 marginal and 16,150 prorated wells of which about 9,500 are flowing.

The great bulk of the prorated wells could take advantage of the Atlantic plan, the company contends.

But, taking only the flowing wells and assuming Atlantic's operating cost figures to be representative over the field, the company has come up with a rough estimate that operators could save about $415,000 a month by producing 1,200 of 9,500 flowing wells and shutting in the rest.

This would snowball to almost $5,000,000 a year, $50,000,000 in 10 years, $100,000,000 in 20 years.

No harm to field . . . Adoption of this proposal would do no harm to the field, Atlantic engineers contend. It would not tend to cause fingering or coning.

The company points out that there already is a rule for the field, Rule 13, designed to prevent such an occurrence. This rule provides that wells with total depths within 10 ft. of the Woodbine water table may not produce at rates of more than 20 bbl. an hour (or 480 bbl. a day). Under the Atlantic proposal, maximum production would be around 50 bbl. a day.

Furthermore, Atlantic contends, its suggested rules change is not a drastic departure from what is already being done.

"Transfer of allowables from one well to another is not a new idea in East Texas field, it has been done for a long time under at least four different rules," a spokesman argues.

Support growing . . . Backing for the Tidewater or Atlantic plan or any other which would tend to accomplish the same thing is building up fast among East Texas field producers.

Tidewater sent out letters explaining its proposal to operators of all prorated wells in the field and asking for comment. It has received replies from operators of more than 10,000 wells saying they would support it.

Major companies and independents appear to be seeing eye to eye. Such firms among the majors as Humble Oil & Refining Co. (biggest operator in the field with some 2,500 wells), Atlantic with about 1,400, Sun Oil Co. with roughly 480, Texaco with around 416, Gulf with over 1,000, Pan American with about 1,500 wells, and Sinclair with roughly 630 reportedly all are in favor. No major is known to dislike the general idea.

Smaller companies such as Three States Natural Gas Co., British-American Oil Producing Co., and Amerada Petroleum Corp., also are reported staunch supporters.

A Journal survey of independents turned up no criticism. Those contacted either felt it a good idea or professed little feeling either way with the opinion that it wouldn't affect their particular operations.

William D. Gray, vice president of Gray Wolfe Co., Houston, with 19 wells, said his firm was "very much in favor of the idea."

"We think operators in this country—instead of yelling about cheap foreign oil — should attempt to do something to cut their own operating costs. And this includes doing something to increase spacing in old fields.

"Mobil Oil Co. is trying to do the same thing in a different way in its application to pool 20-acre spacing units in West Ranch field on the Gulf Coast into 40-acre units."

Here are some other comments:

Joe Zeppa, president of Delta Drilling Co., Tyler, a company with 54 wells in the field, says: "I feel a feasible order to accomplish such allowable transfers is possible and desirable. I am in favor of it. It would save on labor costs, equipment costs, and help do away with the impracticle, unenforceable idea that the allowable must be produced each day from each well.

"I feel, however, that a limit should be placed on the amount of allowable that can be transferred so as to not exceed the allowable given a marginal well."

Bud Still, manager for Ben Laird, Kilgore, with three wells: "We feel either of the proposed orders would be all right. The general idea is good. We also think something ought to be done about the discriminatory marginal well situation in the field. It's all wrong for a marginal well to be permitted to produce three times as much oil as a top-allowable well in the same field. And the situation continues to get worse."

Jake Hamon, Dallas independent with 58 wells: "If such an order were well administered we would have no objection to it. I can see where it would be a fine idea for many companies that are straining to cut operating costs. We can't see, however, where we would benefit greatly from it in that our labor costs are about as low now as they could go without some form of automation."

How Diesel Taxis Are Saving Money in London

Operating Costs

(Based on 20,000 miles per year)

	Gasoline	Diesel
Depreciation	$336	$364
Services	98	112
Tires	135	135
Battery	14	17
Lube Oil	14	14
Fuel (both at 60c a gal.)	750	400
Total	$1,347	$1,042

Savings per year with diesel $305

Original Costs

Diesel taxi $3,640
Mileage averages
30 miles per gal.

Gasoline taxi $3,360
Mileage averages
16 miles per gal.

Extra cost of diesel $280

Wider Use of Diesel Autos Forecast

- Speakers at SAE meeting say the family car of the future probably won't be powered by diesel engines, but look for an increase in the commercial-vehicle field.

WHAT type of power plant will be under the hood of the new automobile you drive a few years from now?

If it's the family car, chances are it still will be a gasoline engine. If it's a more expensive make, a gas turbine may be the power source.

But if the auto is a company car and your job requires considerable driving, there's a good chance you will find a small diesel engine under the hood.

This outlook was expressed by two speakers at the Society of Automotive Engineers meeting in San Francisco last week. Both were diesel manufacturers from England, where diesels are being used much more extensively.

Why the trend . . . J. H. Pitchford of Ricardo & Co., Ltd., Sussex, England, does not foresee the small diesel engine being widely used in family cars of the future. This is due mainly to the higher first cost of the diesel, and because of its higher noise level.

It is in the utility class of autos that he sees the small diesel making striking progress. Taxicab and delivery-van companies, as well as firms operating large fleets of cars at large annual mileages, are the most likely prospects. For, in these fields, the advantages of the diesel show up at their best; i.e., conditions of frequent starting and stopping, a very light mean-load factor, and a large annual mileage.

"In this field I think that engines in the range of 100 to 150 cu. in. swept volume—the majority 4-cylinder—will dominate the picture," he said. "There is every chance we shall see increasing use of turbo-charging, even on these relatively small engines."

First cost of diesel will always likely be higher than that of a gasoline engine, Pitchford said. But the price tag for a $3,000 diesel auto now is only some 8 to 15% higher than for its gasoline-engine counterpart.

Lower fuel consumption of the diesel, particularly under conditions where there is a high proportion of light load running and idling, more than offsets this disadvantage, Pitchford pointed out. The experience in London, where nearly all of the 5,000 taxis are diesel powered, has been an 85 to 90% increase in mileage. Even when fuel costs are equal, it's more economical to operate a diesel taxi.

Conversion no problem . . . J. G. Dawson of F. Perkins, Ltd., Peterborough, England, also sees the modern diesel engine as a serious competitor to the gasoline engine in most commercial applications.

One reason for this is that conversion of gasoline-powered vehicles to diesel operation is now much less of a problem. Modern small diesels have characteristics sufficiently close to those of the gasoline engine to allow their installation without major changes in vehicle design. In Britain, he pointed out, the excess cost of the diesel over the gasoline vehicle is now only a few hundred dollars.

The fuel situation needs to be given much more attention, Dawson declared, in view of the more widespread use of the diesel. Any widespread swing to the diesel in the United States is likely to lead to a severe fuel shortage.

From the engine manufacturer's viewpoint, there also is need for fuels with better smoke limits and reduced combustion noise. Improved volatility and lower ignition temperatures probably would improve both shortcomings he stated.

"Even small improvements would be valuable," Dawson said in urging oil companies to devote more research toward improved diesel fuels.

Suppliers Ask Curtains for Oil Shows

• The big IPE at Tulsa would suffer the most if major suppliers pull out, but request from PESA directors also is aimed at Odessa and Lafayette shows. First reaction of show officials: The shows will go on.

THE future of oil-industry equipment shows has become uncertain following a request from major suppliers who exhibit that three of the most popular expositions be discontinued.

The fold-up request was aimed at Tulsa's International Petroleum Exposition, the granddaddy of all oil shows; the Permian Basin Oil Show, Odessa, Tex.; and the Louisiana Gulf Coast Exposition, Lafayette. The request came from the Petroleum Equipment Suppliers Association.

First result was immediate moves by officials of the three shows to save their projects from ruin. All declared the exhibits served a legitimate need in the industry with advantages both to the operating people and the suppliers.

But back of the suppliers' desire to fold the shows are slowed-up economic conditions in the oil industry. This means that whether the expositions continue successfully probably will depend on a business recovery.

What happened . . . The oil-show issue was precipitated by announcement of official PESA action at its recent convention in Banff, Alberta.

PESA members voted to recommend to officials of all oil-industry shows that their exhibits be discontinued. This recommendation was then revealed last week in letters sent by H. R. Safford, Jr., PESA executive vice president, to W. K. Warren, president of the Tulsa show; J. C. Hostetler, president of the Odessa show; and Leo Franquez, president of the Lafayette show.

The letter did not declare that the equipment suppliers would boycott any particular show or that they would trim down their exhibits. It merely stated the desire of PESA directors that no more shows be held.

Why the action . . . Although PESA itself gave no reasons for the action, individual supply men who are members of the association freely explained the move was prompted by poor sales.

C. R. Zimmerman of Bethlehem Supply Co., Tulsa, said exhibiting at oil shows was too expensive. He reported that the six major supply companies as a group made only $1.5 million on 1958 business and at the 1959 Tulsa oil show spent $3 million.

"That just doesn't make sense," Zimmerman said. "We're just not compensated for the show expense either by increased sales or by general promotion.

"You don't sell equipment at an oil show," he added. "You sell a rig, for instance, through your credit department—by the trade-in allowance or payment terms."

Zimmerman also noted that many Tulsa business leaders fear that if the IPE is discontinued some other large oil center such as Houston or Dallas, will pick up the show.

"That won't happen," he said. "If the suppliers decide they can't support a big show in Tulsa, they won't go into any other show either."

One independent supply-company official revealed there was strong sentiment among members of the supply industry against holding another big show at Tulsa.

"We feel that the shows just don't justify their costs," he said. "Times and conditions have changed in the last few years. Suppliers have found they can sell more successfully if they take their customers right into the plant where the user can see the equipment made, see the materials that go into it, and become acquainted with new developments that way.

"It's much more effective than showing him the equipment on the floor of exhibit space at a show—and less expensive."

Another major supply executive said flatly: "The profits have gone to hell in this business of ours, and the volume has dropped out of sight, too.

"Exhibiting at the oil shows has become a poor deal from our individual economic standpoint and from the standpoint of our relations with the oil industry," he said.

"The oil people themselves are in the middle of an austerity program, cutting costs. They would surely think something was seriously wrong with our profit margins in the past if we should continue to make such expenditures at shows in the face of business declines."

A complaint . . . The expense of exhibiting at the Tulsa show drew a caustic complaint from the official of a large service company.

He said his company planned to withdraw from the Tulsa show and confine its activities to the regional oil shows and the various association meetings and conventions.

The company's display last year at Tulsa cost $50,000 compared with a cost of slightly more than $2,000 for making an AIME meeting, for instance. He added that his salesmen felt the AIME meeting accomplished more for the company.

The official complained also that Tulsa business and labor people gigged exhibitors at the last show. He cited an $1,800 bill for services of a janitor 2 hours daily during the show and a $10,000 bill for painting a 200-ft. square concrete floor.

Show must go on . . . The PESA request, however, failed to disrupt plans in Tulsa for another international show in May, 1965.

IPE President Warren, board chairman of Warren Petroleum Co., declared, "We have no intention of discontinuing the Tulsa show."

Warren said preliminary plans already were under way and many exhibitors had indicated they would show. He explained that the 6-year

Fact Booklet Sells Fast

THE JOURNAL'S new oil-fact booklet, "Why Is Gasoline Such a Bargain?" has been reprinted in quantity to take care of the large number of requests.

Your company may still obtain additional copies for distribution to the public. The 20-page booklet is simply written and well illustrated to put your message across clearly and rapidly. It's especially designed for distribution at service stations, and to stockholders and employes.

For price details and orders write today to Reader Service, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

interval between shows was adopted so there would be enough new developments in equipment and services to make the show significant.

Warren declared that the Tulsa exposition is ideally equipped with permanent buildings paid for. Many exhibitors have buildings of their own, and there's space for expansion, he said. Warren expressed hope that economic conditions in the oil industry would be sufficiently improved by 1965 to encourage firms to exhibit.

The Tulsa show probably would be hurt more by a decision of major suppliers not to show than would the Odessa or Lafayette shows. The smaller shows attract local or regional supply and service firms as exhibitors more than the big supply firms.

The Lafayette show sends a delegation to the Odessa show to contact companies exhibiting and invite them to the Louisiana exposition. Franquez said he plans to confer with PESA officials in Houston soon to discuss future plans for the show. The Odessa show is scheduled for October 20-23. No immediate plans have been made to discontinue it.

The equipment shows have proved popular attractions for operating oil men and at least one oil man, John Duffield of Highland Oil Co., Houston, explains why: "I see equipment assembled at the Tulsa show that I would never see unless it was gathered under one roof for a show."

Duffield, who said he has seen every Tulsa show, declared desire of supply people not to show stems from their pessimism over current business. "Conditions will get better and shows in the future will be worthwhile."

Trans-Prairie Line Approved

CERTIFICATE for the construction of a 130-mile 8-in. crude line in northern British Columbia—the first to be built wholly within the province—has been granted Trans-Prairie Pipelines, Ltd.

Construction will get under way immediately. The line will move crude from the Milligan Creek - Boundary Lake area, about 100 miles north of Fort St. John, to refineries at Taylor Flats and Dawson Creek. It will have a capacity of 20,000 bbl. per day and is expected to be completed and in operation within 13 months.

Trans-Prairie, a Canadian company which operates extensive pipeline systems in Manitoba and Saskatchewan, was one of four original applicants for the line when a public hearing was held a year ago. A certificate was granted to Peace River Oil Pipelines B.C., Ltd., but this company later dropped the subject.

watching WASHINGTON

Clyde La Motte

• Interior makes foreign oil data available . . .

ONE OF the less-publicized activities at the Department of Interior is that of its Division of Foreign Activities in the Bureau of Mines.

This division compiles information on metals and minerals, including petroleum, from various parts of the world. Most of the information is gleaned from books, magazines, and papers published in those nations.

This information is available to the public. If, for instance, you have a question on some oil operation in a foreign country, the division may be able to supply the answer from its voluminous files.

Because of its name, the division very nearly got its budget chopped off by Congress this year. Some congressional committee member, poring over Interior's budget, arrived at the conclusion that the function of the division was to promote foreign activities in minerals and metals. He reasoned that this would mean more competition for the domestic industries and of course should not be supported by U. S. taxpayers.

It took considerable explaining by Interior to straighten the matter out and get the budget restored.

• Specialists collect facts on Russian expansion . . .

One area being given particular attention these days by the Division of Foreign Activities is the Russian oil expansion. Involved in this work are Alexander Gakner, the division's east European specialist, and his assistant, Donald J. Frendzel.

Gakner, born in Poland, spent 6 years in Russia before he came to the U. S. in 1947. He studied at the Gronzny Petroleum Institute in Russia and, after coming to the U. S., attended Columbia University to get a degree in mining engineering.

Gakner currently is in Russia with the group of U. S. oil men making a tour of Russian oil installations.

Frendzel, who reads Russian fluently, has spent much of his time since joining the division last year translating Russian oil publications. He has an undergraduate degree in geology and a graduate degree in mineral economics.

• Soviet oil progress has its problems, too . . .

From their studies of Russian oil publications, Interior's specialists have developed some definite impression of both the progress and the problems the Russians face.

As could be expected, the progress gets a great deal more publicizing than do the problems.

The big gain Russia has made, of course, is in increasing its crude production. The Soviets are putting a great deal of money and effort into their drive to more than double their 1958 production by 1965 and to triple it by 1972.

They have 412 seismic crews working and hope to triple that by 1965.

They also hope to double their pipeline mileage by '65, and to make substantial increases in refining capacity.

But the Russians have their troubles, too. Although they have a great deal of modern equipment, they don't have enough, so that work in some areas has to be done with obsolete tools.

They seem to have a chronic shortage of pumps and compressors, and one of their worst headaches is in spare parts. Seems that the Soviet factories don't get as much credit for spare-parts production as they do finished units. So they make as few spare parts as possible.

The Russians need pipe, too, and have gone into the world markets from time to time in search of it.

Their refinery expansion has lagged and they don't have enough tankers. In each case, however, they appear to be making moves to try to correct the situation.

Suppliers' Views on Giving

FOR

- "The amount of business we get is in direct proportion to the distance we take our clients on pleasure trips and the number of days we keep him there."
- "We are coordinating our giving, not abandoning it. It still is a mighty important sales tool."
- "We'd sure quit passing out gifts if our competition would."
- "A small packet of cheese is our traditional gift. It's a modest item. By no stretch is it a bribe."

AGAINST

- "A smile will build more goodwill—and business—than all the material favors you can corral."
- "The sentiment with which some businesses extend favors and gifts is a mockery—it simply tells the recipient 'We own you.' "
- "When giving is modest and in good taste, it's a wonderful business practice. When you go overboard—and get lavish or extravagant—you aren't expressing sincere goodwill most times, you're buying somone."

Gifts to Oil Men Being Soft-Pedaled

• There definitely will be fewer and less expensive gifts passed out next Christmas. And some suppliers and service companies are examining their entire customer-relations program with an eye on eliminating any excessive giving. They want goodwill, but not the kind you buy.

AUGUST may seem a poor time to think about Christmas, but executives of many oil companies and supply firms are doing just that, and this is what they're thinking.

They'll still honor the spirit of Christmas this winter, but the sacks of presents they scatter around the industry will be smaller and less expensive.

Two trends are back of this general move to eliminate or at least curtail corporate giving at Christmas. The economic pinch with emphasis on cost cutting is forcing executives to question the extravagances of the past. A new emphasis on propriety also makes them question the wisdom of "buying" friends with lavish gifts.

The curtailment is going beyond holiday gifts, and several firms are pointedly informing both their employes and suppliers that gifts to employes are contrary to company policy at any time. Fear that the "payola" label will be placed on acts of kindness, generosity, or goodwill undoubtedly is playing a role in this general attitude toward business gifts.

Many join in . . . The crusade toward less extravagance in business giving at Christmas is getting strong support.

Its backers include company presidents, purchasing agents, suppliers, and even the gift makers.

Most oil companies in their pre-Christmas caution notes being sent out this summer state that giving or accepting favors has long been contrary to company policy. The rule is simply being underscored now with the added emphasis that violations will not be tolerated.

A few executives point out that the dividing line between the legitimate holiday greeting and a remembrance which may take on any "appearance of evil" must be a matter of the individual's judgment. Nearly all leave no doubt that unusual entertainment, expensive gifts, or extravagant trips are in the forbidden category.

Talks with oil-company officials reveal that the swing away from corporate giving at Christmas and a trend to the holiday card or inexpensive novelty gift has been growing for at least 3 years.

The former giving policy came into disrepute mainly because less than half of those receiving gifts ever bothered to acknowledge them. Executives said this tended to put the giving in the routine category and left doubt whether they really were effective in building friendship or goodwill.

In place of gifts, some oil firms have started diverting the money usually spent on gifts into some charity. Contributions have been made to the American Red Cross, the Heart Fund,

or to other agencies. Companies following this custom now send cards to their customers or friends who formerly were on the gift lists advising that a sizable gift has been sent to charity in their names.

Other companies who still plan to send out gifts at the holiday season are pruning their gift lists or keeping the gifts modest. One supply firm which has kept its gift modest through the years will continue to send out a pound of good-grade cheese to its friends and clients.

The company president defends his policy like this:

"We've done it for years and we want to continue the gifts. We've never thought of them as bribes. It's a holiday gesture, and we get a kick out of giving. It's true our lists change and perhaps as many people this year will get cheese who have not bought anything from us as those who have given us business. We feel sincerely it is on a friendship basis."

The reaction . . . Executives of supply firms which naturally are on the giving end at Christmas say they welcome the oil-company stand against gifts.

They warn, however, that any blame for past abuses in giving must be shared by the companies.

"Oil companies have been a little lax in the past, too," one supply man declared. "Some men in the field still are asking favors. The suppliers are glad that the companies are taking a hand in stopping the abuses.

"I've initialed the letter from one oil company warning of penalties for 'buying business with gifts' and I'm sending copies to every store we have."

The sales manager of a large service company said flatly: "We don't believe a bribe should be given for business—and that is what this practice amounts to. We haven't sent out gifts for some time—we only send a calendar and some cards at Christmas.

"We believe our policy in recent years has lost us some business. But it isn't lost for keeps; the customers usually come back. We are trying to build business for years ahead and not just for a couple of months. Bribing people does not work forever. If people can be bribed, they will want still more later."

The executive vice president of a tool firm praised the oil-company letters circulating this year warning against lavish gifts.

"Like everything else," he said, "things get abused. The warnings are not for the 90% who indulge in small gratuities or none at all, but for the 10% who go beyond good taste.

"We used to send out inexpensive gifts, tie clasps, cuff links, cigaret lighters, and such. We gave them to drilling contractors and suppliers. But 2 years ago, we dropped this practice. Our lists grew to several thousand—and it began to mean a real expense.

"We believe that improved service to customers has done more for our business than handing out gifts. We don't even send out Christmas cards."

Not all austerity . . . The dampener on holiday giving really has caused many executives to examine their entire policy of customer relations.

Most companies don't intend to eliminate entertaining, convention hospitality, flying customers to special events, or taking them on boating, fishing, or hunting trips. The tendency, however, will be to make them less expensive and to eliminate the abuses which have arisen.

One major supplier said his company has been nicked beyond reason in the past to help foot bills at conventions and meetings. He reported the firm will still go along with the practice but on a less extensive scale.

On the matter of special trips to the Kentucky Derby, world series, bowl games, or to Las Vegas, this executive said his company has no intention of eliminating them.

"Trips pay dividends," he said. "It's the best way we know to get acquainted with your customers."

Another company is closing the door diplomatically on its facilities at fishing and hunting lodges.

"It got to the point where people asked us if they could use our boats and docks on certain weekends. We really didn't mind except we found that in many cases the people taking over the facilities were not in positions to have the final word on buying of services and materials."

Code for buyers . . . Standards of conduct have been drawn up for its members by the National Association of Purchasing Agents recognizing the dilemma posed by business gifts.

The code says in part:

"People engaged in purchasing should not accept from any supplier or prospective supplier any money, gift, or favor which might influence, or be suspected of influencing, their buying decisions.

"We must decline to accept or must return any such gift or favor offered us or members of our immediate family . . . Possible embarrassment resulting from refusals does not constitute a basis for an exception.

"The term 'gifts, gratuities and favors' includes, but is not limited, to monies, credits, discounts, seasonal or special occasion presents (Christmas, birthday, weddings, etc.) edibles, drinks, household appliances and furnishings, clothing, loans of goods or money, tickets to sporting events, theaters, dinners, parties, transportation, vacations, travel, or hotel expenses and various forms of entertainment."

The purchasing agents, however, take to task many companies which wear two hats on the gift question. The NAPA code notes: "It is difficult to reconcile the philosophy of a purchasing department, which does not desire to receive gifts, with that of a sales department in the same company which makes it a regular practice to present gifts."

It's just such a squeeze within a company that many oil officials are trying to eliminate by their mid-summer warnings on holiday giving. They want no guesswork on what the company's policy will be. They want to eliminate the abuses and the expense of unnecessary gifts.

FPC Boosts Price of Oklahoma Gas

EIGHT Oklahoma producers selling gas to the Natural Gas Pipeline Co. of America will get 15 cents per thousand cubic feet of gas, instead of the 11 cents a Federal Power Commission examiner had recommended earlier.

This was the key point in an FPC ruling on an application of Natural Gas Pipeline for approval of a $62.5-million project to increase its pipeline capacity by 185 million cubic feet daily.

The project, which supplies gas primarily to the Chicago area, has been in operation for about 1½ years under temporary certificates. The FPC approved the proposed 13-cent initial price for gas sold from fields in Jack and Wise counties, Texas, in addition to hiking the price for the Oklahoma producers.

The Oklahoma producers had asked for 16 cents, but the examiner trimmed that to 11 cents, the highest price the FPC had authorized previously to last September for gas in central Oklahoma.

The commission, in trimming the producers proposed price back from 16 cents to 15 cents, told them they would not have to refund the 1-cent difference on the gas they had already sold to the pipeline. This was unusual action, since ordinarily such refunds are required.

Reds Busy Lining Up Tankers for Cuban Run

• Enough Black Sea oil is moving to Cuba to keep refineries running at about half capacity. Threat of boycott by major oil companies has done little to keep tanker owners from signing charters with Russians.

FEELING is growing in New York shipping circles that the warning of major oil companies against hauling Russian oil isn't going to work.

When Fidel Castro's revolutionary government seized three privately owned refineries in Cuba last month, after they refused to handle Russian crude, the companies threatened to boycott any tanker that helped the Russians supply Cuba (OGJ, July 18, p. 82).

But the Russians have succeeded, in a variety of ways, in obtaining tankers for the Black Sea-Cuban run to keep the plants running at fairly high throughputs.

Cuban demand has been averaging 60,000 to 65,000 bbl. per day. When Castro took over the 83,500-bbl. refining capacity owned by Standard Oil Co. (N. J.), Texaco Inc., and Royal Dutch-Shell, the plants were reported to be operating at two-thirds of capacity. They were using Venezuelan oil.

Now, best estimates are that Russia is providing enough Black Sea oil to run the refineries at about half capacity.

Tanker brokers and owners believe Russia can continue to supply Cuba at this level, or higher, as long as the Reds consider Castro important enough to them to pay the price in higher tanker rates and sacrifice of regular oil customers.

Soviets charter tankers . . . Since Jersey Standard's "expression of feeling" about tanker owners and brokers who do business with the Russians, several charters have been "fixed."

One Yugoslav tanker and one Italian tanker were chartered for 12 months and several single-voyage charters have been reported within the past 10 days.

Cuba itself has been unable to obtain tankers on the spot market—ship owners are skittish about payment, for one thing. But Sovfract, the Soviet Government's chartering agency, has been successful in obtaining a number of foreign-flag tankers.

Jersey Standard has reported no open instances of flouting of its position—Jersey avoids the word "boycott"—but charters are nonetheless being made, if not directly for the Black Sea-Cuba run, then to release tankers for this service.

Brokers report Russia is the most active inquirer in the tanker market. The Soviets, and the premium rates of 50 to 60% above the going rate that they are offering, provide almost the lone bright spot in a market that has been depressed since the Suez Canal was reopened.

Dilemma . . . Independent tanker owners, many of them with their backs to the wall, say the oil companies have placed them in an impossible situation.

Some have ships which haven't had a charter in 3 years. Meanwhile, interest and amortization have continued and threatened owners with bankruptcy.

"What difference does it make to me" asked one such owner, "whether I go broke because my ships are laid up now or because the majors won't do business with me?"

The tanker slump began in the spring of 1957. Rates on petroleum (dirty) from the Caribbean to the New York area were $7.86 per ton in February 1957. This compares with $1.05 per ton in January 1958, $1.17 per ton in June 1958, $1.51 in January 1960, and $1.10 at present.

Tanker owners say they lose money at current rates, and suggest that the oil companies, or the Government, ought to bail them out. The Suez crisis stimulated new construction to the point that new tonnage has been added much faster than scrapping and increased demand could absorb.

Russia exploits situation . . . Some 10% of the world tanker fleet is idle, and part of the active fleet is operating at reduced speed, according to shipping interests.

This situation comes at a time when Russia is stepping up its drive to invade traditional western oil markets.

These low tanker rates—providing cheaper transportation than Russia could obtain by building up its own fleet—have had a major role in the rise of Soviet oil exports from 18,138,000 tons in 1958 to 25,372,000 tons in 1959.

"The fact that over 6.6 million deadweight tons of tankship tonnage is currently laid up is bound to work in favor of the Soviets," says Ralph E. Casey, president of the American Merchant Marine Institute, Inc.

A way out? . . . Various proposals

PIPELINE BRIEFS . . .

A tariff reduction of 5 cents a barrel will go into effect on Montana's Powderriver line October 1, for crude moving from Sumatra and other Central Montana fields to Laurel, Mont. On this date operation of the line will be taken over by Crude Oil Pipeline Co. which is purchasing the line from Powderriver Pipeline Co. Field extensions on the line to Ivanhoe and Keg Coulee are to be completed this fall.

Michigan Wisconsin Pipe Line plans to start construction immediately on a 250-mile 24-in. pipeline in Kansas, Missouri and Iowa. Contract has been awarded to R. H. Fulton & Co.

Construction was scheduled to start last week on 75 miles of 30-in. line in Arkansas by Peoples Gulf Coast Natural Gas Pipeline. The line is being built by River Construction Co.

San Diego Gas & Electric is connecting the Rainbow meter station and San Diego with a 51-mile 30-in. line. Stanley-Bledsoe Corp. is the contractor.

Northern Natural, Omaha, will add a 7,000-hp. compressor station, 40.8 miles of gathering lines, 50,000 M.c.f. per day in dehydration capacity, and 100,000 M.c.f. per day in extraction facilities in Ochiltree and Hansford counties, Texas.

Panhandle Eastern Pipe Line will spend $5,000,000 in storage and production tests in its Waverly storage field in Morgan and Sangamon counties, Ill. Panhandle has been developing the field since 1952 and has been doing injection and storage testing since 1956. Prime purpose of the testing is to determine withdrawal rates.

to freeze out the Russians and buoy tanker rates have been advanced.

Casey has suggested that European nations—particularly those in NATO—follow the lead of the United States and establish a reserve fleet to pull part of the tonnage out of the world market.

"The withdrawal of a substantial number of ships from commercial operation could well provide the stimulus needed not only by our merchant fleet but by those of Western Europe," he says.

Independent tanker owners are discussing establishing a world-wide tanker pool wherein 4% of the earnings from the active fleet would be shared with owners of idle ships in the pool. Major oil companies will have nothing to do with this idea for antitrust and other reasons, although the pool would work to deny tankers to the Russians.

Even some independent tanker owners oppose it on grounds it contains the seeds of its own destruction. They reason thus: Placing sizable tonnage in a pool would soon raise rates on active tankers. And the minute rates go up, tankers would start coming out of the pool to compete for business, and the market starts tumbling again.

There is some hope that the slowdown in tanker construction will eventually stabilize rates. But estimates place this at 2 years down the road. In the meantime, the market may continue depressed, with the Russians being among the major beneficiaries.

Texas Holds to 8 Days Again

TEXAS will enter its fifth straight month on a skinny producing day crude-oil diet in September.

The Texas Railroad Commission last week set the initial allowable for September at 2,645,306 bbl. daily, despite ominous predictions by two major crude buyers that Texas, by so doing, stands a good chance of losing crude markets to other states.

Humble Oil & Refining Co. and Standard Oil Co. of Texas both said they are having a hard time finding enough Texas crude. The companies sought a 10-day allowable. However, eight companies nominated 8 days and three 9 days.

In holding the allowable to 8 days, the commission obviously is continuing to apply pressure on crude buyers to sop up surplus products. The September allowable will be up 15,237 bbl. daily from the initial allowable for August and up 52,559 bbl. daily from that in effect August 6. The increase is due to 1 less calendar day in September.

Board Weighs Athabasca Test Requests

THREE COMPANIES last week gave evidence before the Alberta Oil and Gas Conservation Board supporting requests to conduct three different types of experimental recovery operations in the Athabasca oil sands.

Cities Service Athabasca, Inc., proposes to continue extensive experiments in the Mildred Lake area. It's process calls for bucket-wheel removal of sands and extraction of oil from the sands by water treatment.

Operations dating back to 1955 have cost $9,000,000. If further tests are approved, another $6,000,000 will be spent the next 3 years. Cities Service is operator for a group composed of Imperial Oil Ltd., Royalite Oil Co., Ltd., and Richfield Oil Corp.

Pan American Petroleum Corp. is asking permit for a test program involving air injection and combustion.

The tests will continue from 6 to 12 months. Seven wells will be drilled, classified as four observation wells, and three producing and injection wells. About 100,000 acres are involved in two prospecting permits held by Pan Am.

Shell Oil Co. of Canada gave testimony supporting its application for proposed injection of steam into test wells.

Cities Service has nearly 100 workmen living at the site of its Mildred Lake experiments. Supplies and equipment for the sand extraction work are flown from Edmonton.

Work has begun on 30 miles of gas gathering lines, 65 miles of transmission lines, and 77 miles of distribution lines to serve domestic and industrial users in Delta and Montrose, Colo. Clearing and right-of-way crews of H. C. Price Co. have started construction work. Completion is expected this fall. The gas system will be operated by the Rocky Mountain Natural Gas Co., Inc., Denver. Gas will be piped from Colbran, Colo., 50 miles northeast of Grand Junction.

Laying of 8-in. mains in Anchorage, Alaska, has begun by Cheney Construction Co. and distribution of gas to residential and commercial customers will begin in November by Anchorage Natural Gas Corp. The $4-million system will be linked with an 80-mile transmission line now under construction between Anchorage and Kenai Peninsula. The line will have capacity of 71 million cubic feet daily.

A 72-mile gas pipeline from Torrington Junction to Westerose-Rimbey, Alberta, has been completed for Alberta Gas Trunk Line Co. The 24-in. line is an extension of Trunk Line's main line. Gathering lines, consisting of 55 miles of 4 through 26-in. pipe, are being constructed near Cessford, Pollockville, Sunnynook and Sedalia. Contractor for the projects is Banister Construction Co., Edmonton.

Total length of crude, product, and natural-gas pipelines in the United States was 730,772 miles as of January 1, 1959, according to the Pipe Line Contractors Association. Ranking states in miles of line were Texas, 124,372; California, 57,392; Ohio, 46,069; Pennsylvania, 45,365; Oklahoma, 39,459; Kansas, 39,222; Illinois, 34,395; New York, 28,051; Louisiana, 28,023, and West Virginia, 23,422.

Crude deliveries by Trans Mountain Oil Pipe Line Co. averaged 125,595 bbl. daily during the first half of the year. Scheduled maintenance work at Vancouver refineries is expected to cut deliveries in the third quarter to 96,000 bbl. daily.

Also for Pipeliners . . .

IN THE NEWS: Oklahoma gas producers win price increase (p. 51) . . . Michigan Wisconsin and Transco given approval for expansion projects totaling $100 million (p. 54) . . . California approval clears way for Alberta-to-California gas line (p. 57) . . . Hess and Scurlock buy Gulf's terminal and pipeline system in Mississippi (p. 59).

PLUS THIS TECHNICAL REPORT: Solid-state supervisory control performs well for Cherokee (p. 77).

Humble Slates Georgia Test

. . . to 10,000 ft. in Wayne County. Other attempts to find the state's first production are planned.

A NEW EFFORT to find commercial production in Georgia is scheduled for 10,000 ft., the deepest goal yet for a wildcat in the state.

The test will be drilled by Humble Oil & Refining Co. 7 miles north of Gardi in Wayne County in the southeastern part of the state. The company expects to spud in about October 1.

The location is on land belonging to Union Bag & Paper Co. and is part of 750,000 acres which Humble has under lease in that part of the state.

The company drilled a well in Georgia in 1949 in Echols County, which is on the state's Florida border. The wildcat went to 4,000 ft. before it was abandoned.

Georgia's first well and dry hole was completed in 1938. Since that time there have been 92 other tries to establish commercial production. In addition to Humble's well, two other new tests have been announced.

Ernest Hill, Houston independent, plans to drill about 8 miles northwest of Americus. J. R. Sealey, Cottonwood, Ala., has been issued a permit to drill 18 miles west of Bainbridge in Seminole County.

If any of these tests strike commercial oil, they will be eligible for Georgia's standing bonus of $250,000 for the first 100-bbl. well.

However, in Humble's case this would not be much of a windfall. The company estimates it will spend that amount to drill its deep test, and says it has already spent $2 million in lease bonuses and delay rentals since 1943.

Offshore work . . . The first commercial seismic survey of Georgia's offshore area is expected to start this month.

Offshore Exploration Group of Houston will be doing the shooting for Pure Oil. The survey work may extend over a 2-month period and is expected to cover the area from the Savannah River to St. Mary's River, and 50 miles out from the coast.

The Decca electronic survey system, a British development which continuously plots the position of the survey vessels, will be used. Offshore Exploration says it is the first U. S. company granted use of the system on an experimental basis.

The survey work hinges on the issuance of a permit from the Department of Interior. However, the Department last week announced an agreement with Georgia to set the stage for granting offshore exploration permits.

Agreements with other Atlantic Coast states are being drafted and will be published soon, an Interior official said. (An earlier agreement covers the Atlantic Coast off Florida.)

Anyone interested in filing a request for a permit should check with the regional oil and gas supervisor of the U. S. Geological Survey to find out which areas are open. The permits will not include core or other exploratory drilling, nor will they give the holder any preference, if and when lease sales are made.

Expansion Projects

. . . by Michigan Wisconsin and Transco in the mill.

TWO major natural-gas pipeline construction projects, adding up to almost $100,000,000, are a step closer to getting underway.

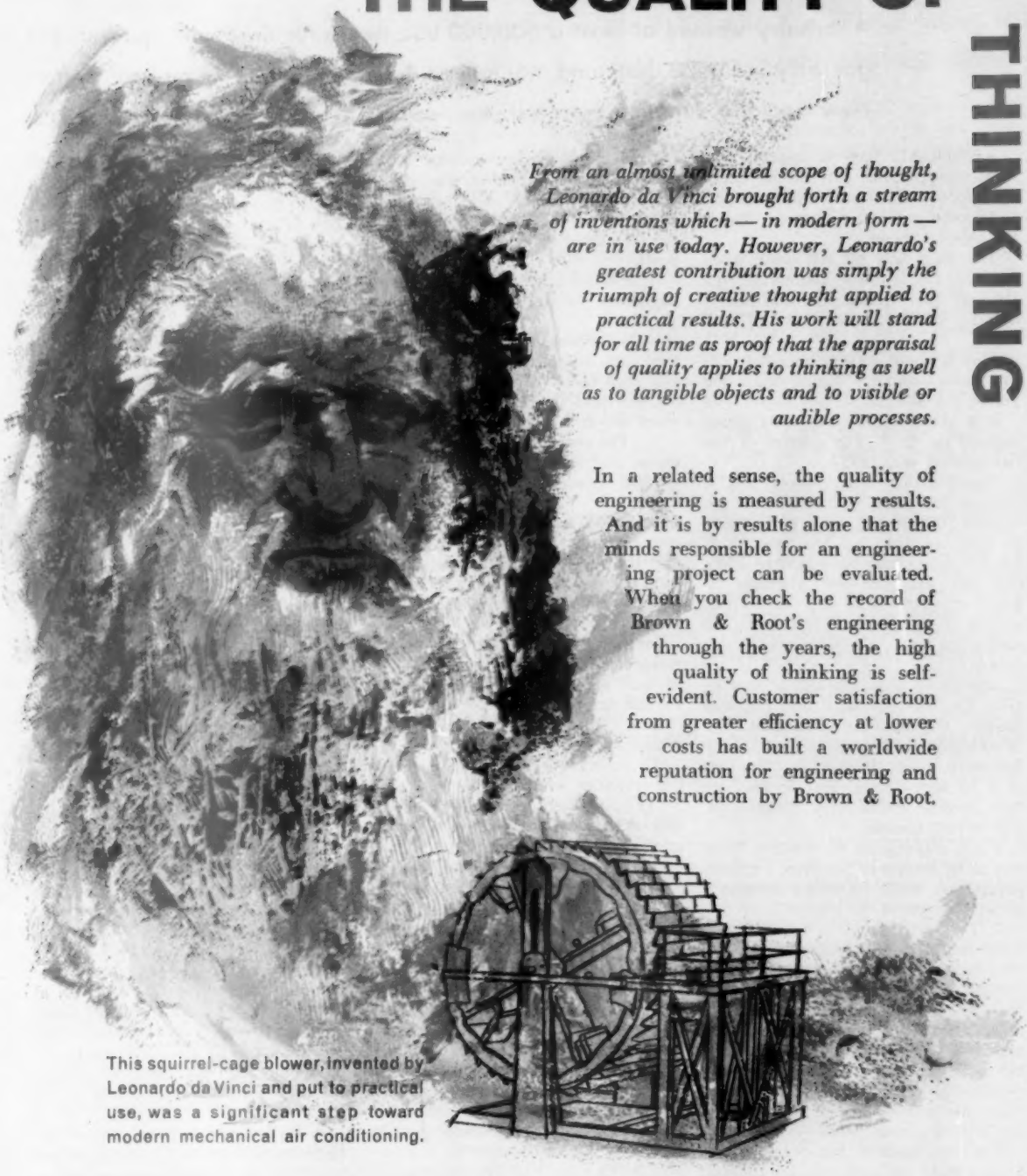
Michigan Wisconsin Pipe Line Co. will spend an estimated $44,876,000 on 567 miles of pipe line and 6,000 more horsepower in compressor capacity. These facilities will enable it to increase its deliveries from the Laverne Field in Harper county, Okla., by some 100,000,000 cubic feet per day. FPC has given this project the go ahead.

Transcontinental Gas Pipe Line Corp. of Houston would spend $52,622,000 on 280 miles of pipeline loops, mostly 36-inch, in the southern half of its system and add 32,040 horsepower to 12 existing compressor stations, mostly in the northern section. An FPC examiner has ruled that the system has sufficient gas available to justify the proposed expansion.

The Michigan Wisconsin project lines up this way: 341.8 miles of 24-in. between stations No. 1 in Kansas and No. 10 in Illinois; 188.3 miles of 30-in. between stations No. 10 and Woolfolk station in Michigan; and 36.8 miles of small diameter lines in Wisconsin. The added horsepower would be installed in the Kansas stations.

These facilities would enable Michigan Wisconsin to meet peak-day requirements of 1,396,000,000 cu. ft., including supplies from storage. It would have more than 200,000,000 cu. ft. available from the Laverne field when the expansion plan is completed. And, FPC says, the company "beyond doubt" has a market for it.

THE QUALITY OF THINKING



From an almost unlimited scope of thought, Leonardo da Vinci brought forth a stream of inventions which — in modern form — are in use today. However, Leonardo's greatest contribution was simply the triumph of creative thought applied to practical results. His work will stand for all time as proof that the appraisal of quality applies to thinking as well as to tangible objects and to visible or audible processes.

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Lid Remains on Residual Oil Imports

• Industry wanted at least a 500,000-bbl. quota for the fourth quarter, but got only 415,000 bbl. and no indication that things will get any better. New England consumers protest, too, saying low quotas invite price hikes.

RESIDUAL fuel-oil imports, the most controversial part of the entire oil import control program, are likely to become even more controversial in the months ahead.

The stage was set last week when Interior Department announced the residual fuel quota for the last 3 months of the year: 415,000 bbl. daily.

This is about 20,000 bbl. daily below actual imports during the same period a year ago.

It is about 20,000 bbl. daily above imports in the fourth quarter of the base-period year, 1957.

The fourth quarter quota was a blow to importers, who had hoped for at least 500,000 bbl. daily, particularly in view of the fact that the third quarter quota had been held to 250,000 bbl. daily, despite warnings by some importers that this would not permit a sufficient rebuilding of stocks to meet the peak winter demand.

Interior's action was also a blow to New England industrial and business leaders. They had sent a delegation to Washington recently to call on Under Secretary Elmer Bennett to complain of a 15 cent-a-barrel hike in residual fuel prices, which they blamed on low import quotas.

Fresh expressions of concern were voiced by leaders of the New England group last week following Interior's announcement of the quotas.

Coal pressure . . . A spokesman for the New England Council, Gardner Caverly, said it is obvious that "our New England congressional delegation must work with greater zeal, if we expect to overcome the influence of the coal industry."

"This is a political year," he said. "But this was no excuse for penalizing New England."

The coal industry has been waging a hard fight to keep residual fuel-oil quotas low, maintaining that quotas higher than 1957 levels would simply enable importers to dump residual in East Coast markets at below-cost prices.

Coal officials argued that 1957 levels would be sufficient to enable importers to fill "normal residual fuel-oil demands." It recommended that fourth quarter quotas be kept around 400,000 bbl. daily.

Coal has had some backing within the oil industry. The Independent Petroleum Association of America, for example, has indicated its feeling that the lid should be kept on residual imports.

Therefore, this appears to be the alignment of forces in the battle ahead:

. . . Importers, New England industrial users and other consumer groups, and East Coast residual fuel marketers will lead the attack on Interior's latest action.

. . . The coal industry, the coal labor union, and some independent producers will defend Interior.

Favor 1957 level . . . Interior has its own defense ready. It can point out that the President's proclamation setting up the residual import control program specifically establishes 1957 levels as the desired goal.

Interior made it clear, in its announcement last week, that it intends to stick to that formula in the foreseeable future.

L. J. O'Connor, Jr., Oil Import Administrator, stressed the fact that the 1957 import level is considered to be the optimum level.

O'Connor declared that the allocation of 415,000 bbl. daily would be adequate to assure a reasonable level of residual fuel-oil stocks during the fourth quarter. He also pointed out that Interior can adjust quotas upward if any real shortages develop, and that the industry has the facilities to bring in large quantities quickly to fill any gap that should develop.

He quietly warned importers, however, that Interior will maintain a continuing review to insure against the development of "artificial" shortages to "normal" customers.

This warning seemed to stem from a situation which arose last spring when Interior was forced to make an upward adjustment in quotas. At that time, Under Secretary Bennett charged that this was necessary because a few big importers had brought in their 6-month quotas too rapidly, thereby lessening the supply available for the last half of the period.

Bennett indicated at the time that he felt some importers had taken advantage of the situation and had broadened their markets by selling residual fuel at low prices. O'Connor's remarks last week concerning "artificial" shortages and "normal" customers apparently were a warning that Interior would be watchful for another such move and would take steps to prevent it.

PROCESSING BRIEFS . . .

Contracts for design and construction of olefin and polyolefin plants in Odessa have been let by Rexall Chemical and El Paso Natural Gas Products, participants in a joint petrochemical venture. Fluor Corp. has the contract for design and construction of Rexall's first polyolefin unit. Universal Oil Products will do the process design for the olefin plant to be operated by El Paso. Fish Engineering will handle mechanical design and construction.

Two major construction contracts have been awarded to Badger Manufacturing. One is for a 32,000-bbl. vacuum distillation unit at Ashland's Catlettsburg, Ky., refinery. The unit, scheduled for completion in the spring of 1961, replaces three smaller vacuum units. The other award is for a Udex extraction unit and ortho-xylene recovery and purification facilities at the Lake Charles, La., plant of Cities Service. The plant will be the largest ever built specifically for ortho-xylene production. It will have an annual capacity of 120 million pounds a year.

A Hydeal unit will be built at the Houston refinery of Signal Oil & Gas to convert an aromatic toluene feed to benzene. The 1,000-bbl. unit is scheduled for completion in January. Procon, Inc., is the contractor.

Major expansion and modernization of its Wurtland, Ky., sulfuric acid plant, and construction of a new bulk acid terminal near New Cumberland, W. Va., on the Ohio River, are planned by the Du Pont Co. When completed in 1961, the Wurtland unit

Alberta-California Line Work to Start Soon

• California passes on its section of the 1,400-mile line. PG&E hopes to make deliveries of Canadian gas to San Francisco by the 1961-62 winter.

THE FINAL approval needed for the Alberta to San Francisco natural-gas line has been won from the California Public Utilities Commission.

The action kicks off construction of the 1,400-mile big-inch system to bring Canadian gas to the West Coast and it also:

. . . **Gives California** a major new source of energy. Most of the gas used in the state now is delivered from Texas by El Paso Natural Gas Co. and Transwestern Pipeline Co.

. . . **Furnishes Alberta's** oil industry the needed incentive to further exploration and development of the province's resources.

. . . **Provides Pacific** Gas & Electric, the largest utility in California and one of the biggest in the nation, with its own natural-gas supply.

The line will be constructed by PG&E and subsidiaries. Construction work on the northern and southern ends of the line is scheduled to get underway in September.

The company hopes deliveries to the terminus near San Francisco will begin in the winter of 1961-62. Initial deliveries will be 415,000 M.c.f. through the 36-in. main line.

PG&E will let contracts soon for work on the U. S. portion of the line which includes 296 miles in California and 614 miles in Oregon, Washington and Idaho. Bechtel Corp. of San Francisco is handling the design work.

Work will start this fall on access roads, clearing, grading, and some trenching will be done. In addition, PG&E hopes to complete some river crossings before winter and to get 40 miles of pipe in the ground in southern Oregon and northern California.

Canadian sections . . . Alberta Gas Trunk Line Co., Ltd. will construct the Alberta portions of the system which includes 55 miles of 26-in., 75 miles of 30-in., and 256 miles of 36-in.

The work on 108 miles of 36-in. in British Columbia will be handled by Alberta Natural Gas Co. PG&E has a one-third interest in this company.

Work on these sections of the line is expected to be initiated this fall.

Canada's National Energy Board and the government approved an export license for this project and others last spring (OGJ, April 11, p. 83). The FPC recently cleared the West Coast project (OGJ, Aug. 15, p. 102).

Pacific Gas Transmission, the PG&E subsidiary which will operate the section of the line in the U. S. outside of California, will also build a 105-mile line from the Canadian border to a connection with El Paso.

The California PUC approval covers the construction of the line from Antioch to San Francisco which will cost an estimated $63,930,000. Total cost of the system is $340 million.

The PUC said PG&E must stipulate that its Canadian subsidiary, Alberta & Southern Gas Co., Ltd., will "exert its best efforts" to keep the price of natural gas down. The commission said it will not permit the applicant to pass on to gas consumers in California any unjustified increases.

North Dakota Lines Set

TWO CRUDE pipeline gathering systems will be built in North Dakota fields.

The State Public Service Commission has granted certificates to Northwestern Refining Co., St. Paul Park, Minn., for a $270,000 system in Glenburn field, Renville and Bottineau counties and to International Refineries, Inc., Minneapolis, for a $185,000 system in Wiley and Bottineau fields in Bottineau County.

Both will connect with Great Northern Railway Co.'s 118-mile line from northern fields to a railhead at Minot. The line is scheduled to be built this year.

Northwestern will use 4, 6 and 8-in. lines. International will use 3½ and 4½-in. pipe.

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will be one of Du Pont's largest acid plants. Another new sulfuric acid plant, being built by Du Pont at Houston, will be completed early next year.

A hydrofluoric alkylation unit is now operating at British American's Clarkson, Ont., refinery. The 3,000-bbl. unit, which cost $3 million, is the company's second alkylation system and the first to use hydrofluoric acid. General contractor was Procon (Canada), Ltd.

A distillate hydrotreater, with a capacity of 30,000 bbl., has been placed on stream at Shell's Houston refinery. The unit uses the Shell trickle-phase process. It has motor-driven-fan air-coolers, automatic tank gaging and blending of feed stocks, and a full graphic panel in the main control room.

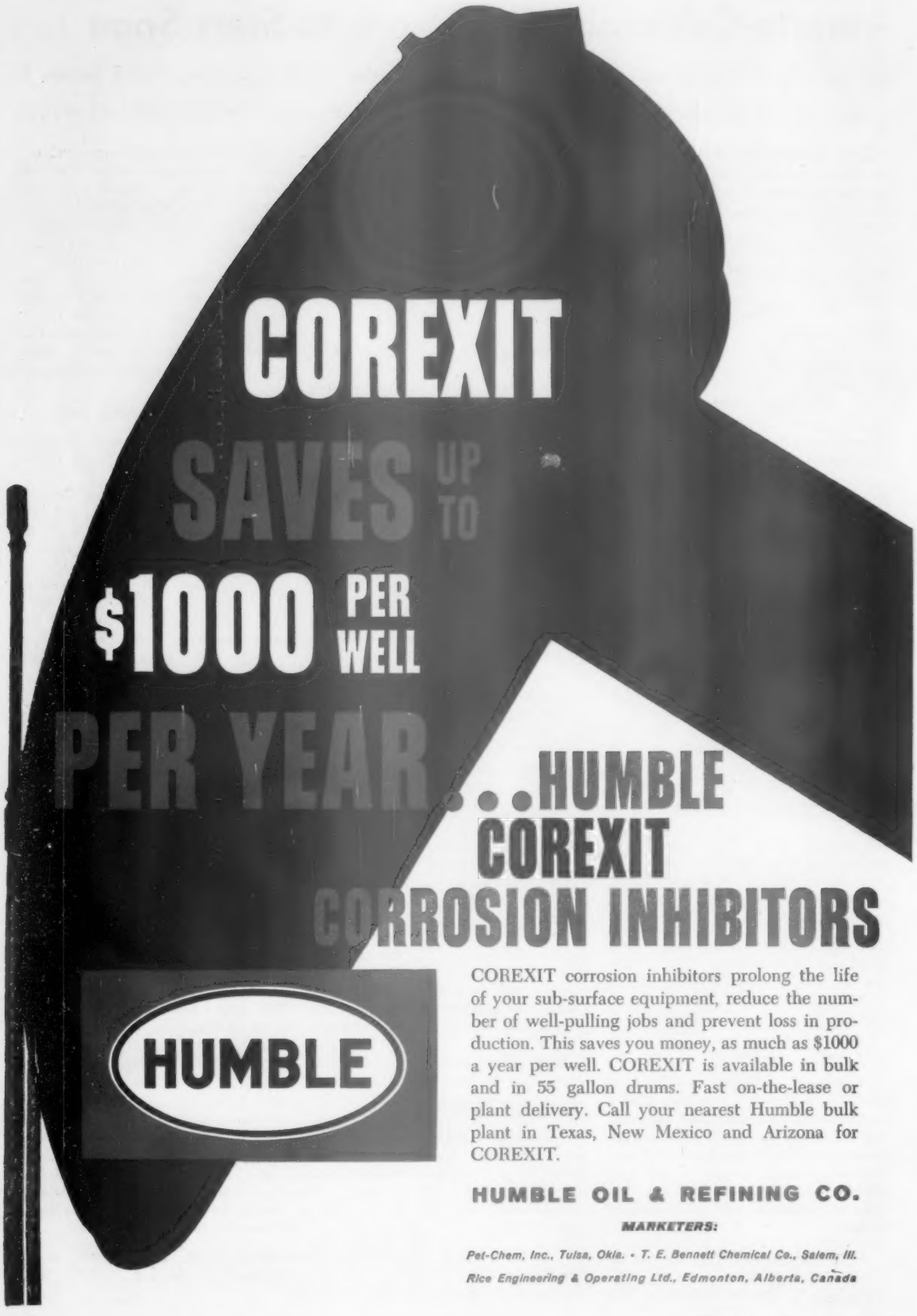
A natural-gasoline plant will be constructed 5 miles southeast of Abbeville, La., by Phillips Petroleum. The plant will process about 45,000 M.c.f. daily of gas produced from the North Erath field. Owners of the plant will include Phillips, Tidewater, Pan American, Robert A. Mosbacher, Jewell M. McDonald, Winston L. Stokes, Thomas A. Durham and Charles L. Beck. Phillips will be the operator of the plant, which will be called the Vermilion Plant. It is expected to be completed in December.

Lone Star Gas Co. has placed in operation a new gas dehydration plant in Rusk County, Texas, capable of processing 46,000,000 cu. ft. of gas daily. The plant is located just north of Henderson, Tex., and processes gas from wells in North Henderson field. Phillips Petroleum is the largest producer in the field. Lone Star laid a gathering system in the field earlier this year. Residue gas leaving the plant enters Lone Star's existing gas-transmission line near the plant on its way to the Dallas area.

Also for Refiners . . .

IN THE NEWS: Diesel engines will prove popular in the future for commercial vehicles, speakers tell SAE meeting (p. 47) . . . Major equipment suppliers ask that oil shows at Tulsa, Odessa, and Lafayette be discontinued. Back of the move: Poor sales (p. 48) . . . Residual imports for fourth quarter set at 415,000 bbl. daily (p. 56) . . . Heavy crudes fare much better than lighter ones in price cutting now going on in Middle East (p. 62).

PLUS THESE TECHNICAL REPORTS: New vapor-recovery unit at Whiting (p. 72) . . . Skelly's new look in control labs (p. 82) . . . LPG truck-loading racks feature self-service (p. 90).



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Gulf Names New Marketing Team

ANOTHER step in Gulf Oil Corp.'s decentralization will shift marketing from the Pittsburgh headquarters to Houston in an extensive departmental reorganization.

Gulf's U. S. marketing activities will thus join the domestic production, manufacturing, and supply departments, which have already been moved to Houston under a decentralization program begun 6 years ago. The announced purposes of the headquarters transfer and realignment are:

... **To provide** better service to customers and promote greater efficiency of over-all operation.

... **To provide** closer coordination with other departments already transferred from Pittsburgh to Houston.

... **To establish** distribution boundaries which are more realistic in conjunction with sales.

... **To shift** more management responsibility to point-of-sale levels.

Gulf's action is another phase in the current industry jockeying for better positions to cope with high costs, hotter competition, and pressure on prices. The reasoning has been behind various reorganizations already made by such companies as Standard Oil Co. (N. J.), Socony Mobil Oil Co., Inc., Standard Oil Co. (Ind.) and others, and a reported pending shift by Cities Service Co.

The management team ... Under the new setup, Gulf will have four regions headed by newly elected vice presidents. Divisions under each are realigned to change distribution boundaries.

Heading the department is J. L. Lenker, Gulf vice president for the U. S. He will be assisted by the regional vice presidents—J. B. Kelley, eastern region, Philadelphia; G. E. Millican, southern region, Atlanta; W. A. Bourne, midwestern region, Toledo, Ohio; and B. B. Pettitt, southwestern region, Houston.

They will comprise the management team for the company's marketing territory, which embraces 38 states and the District of Columbia. The new operating scheme is designed to delegate more authority to the grassroots level.

The men at the top are all veterans. Lenker, a Gulf man since 1934, was a director, vice president in charge of marketing, and a member of the executive committee of British American Oil Co., Ltd., a Canadian affiliate, before election to his present job a year ago.

Kelley, who joined Gulf in 1924 as a salesman at a company service station, was division manager in Philadelphia and in New York before being made a vice president.

Millican, a 48-year man with the company, has been division general manager at Atlanta since 1949.

Pettitt, who joined the Houston sales division in 1929, has been division general manager at Chicago.

Bourne joined Gulf in 1920 in the credit department at Pittsburgh. He has been division general manager at Toledo since 1956.

Hess, Scurlock Buying Mississippi Holdings

GULF Refining Co. is selling its Mobile, Ala., terminal and most of its pipeline system in southeastern Mississippi to a new company now being formed by Hess Trading & Transport, Inc. (OGJ Aug. 15, p. 86).

A half interest in the new company will be owned by Edward Scurlock, chairman of Scurlock Oil Co., Houston, with Scurlock the operator of the pipelines.

Hess and Scurlock are forming a second company to acquire approximately 3,000 bbl. per day of production from Gulf Oil Corp. in Eucutta field, supported by reserves estimated at about 5,000,000 bbl.

The value of the production, pipeline, and terminal facilities is reported to be approximately $8,000,000.

The pipeline consists of 64 miles of 10-in. line from Eucutta to Lumberton and 88 miles of 14-in. line from Lumberton to Mobile. The Mobile terminal has 480,000 bbl. of storage.

Gulf is retaining its gathering system in Baxterville field, the section of the line from Baxterville to Lumberton, and a short line to Purvis (between Lumberton and Hattiesburg) through which it delivers 12,500 bbl. per day of asphalt-type Baxterville crude to the Pontiac Eastern refinery under a long-term contract. May production in Baxterville field averaged 16,187 bbl. per day. Thus, between 3,000 and 4,000 bbl. per day of Baxterville crude is available for movement from Lumberton to Mobile.

Hess and Scurlock are not acquiring the Trans-State Gathering System which brings crude from Heidelburg and Yellow Creek fields to the trunkline terminal at Eucutta. This is owned by E. Constantin, Jr., president of Southland Co., which has a refinery at Rogers Lacy. Trans-State currently is gathering about 14,000 bbl. per day, most of which is delivered to the trunk line at Eucutta.

In May Gulf Oil produced an average of 2,250 bbl. per day from 76 wells on 26 leases in Eucutta field—properties now under negotiation for sale to Hess and Scurlock.

Scurlock has a widespread crude-oil gathering and trucking business in Texas and Louisiana, but has had only relatively minor operations in Mississippi until now.

Combination Pig

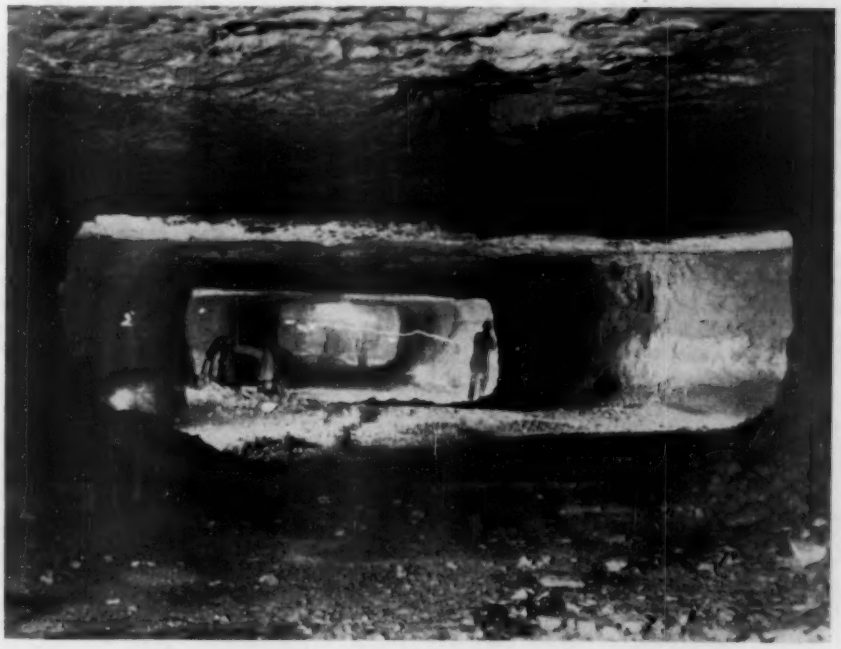
DEVELOPERS of a new pipeline pig, which looks like it has a beach ball in its mouth, report that it will reduce mixing between product batches by 70%. The device was announced by Gulf Research & Development Co. Besides the water-filled ball at the front, it has a steel body and two standard pipeline rubber cups at the rear.

Texas Fill-Up

NOT GASOLINE, but cold air is being pumped into the window of a car as it is serviced at a Conoco station in Bonham, Tex. Operator Stan Norwood installed a 4½-ton gas air conditioner on the station roof with blower and coil between pumps on the driveway. The system can cool the interior of four cars at once and reduce temperatures to 70° on a 110°-day in 30 seconds.

Welding in the Mud

SLOPPY TERRAIN hasn't slowed work on Trans-Canada Pipe Lines' extension which will be used to export gas to the U. S. The 51-mile 30-in. line from Winnipeg to Emerson, Manitoba, is progressing on schedule and is expected to be completed by September. It will deliver 204,000 M.c.f. daily to Midwestern Gas Transmission. Midwestern is laying a 504-mile 24-in. line from Emerson to Marshfield, Wis., with several laterals, to distribute the Trans-Canada gas.



Butane Cavern

WORLD'S LARGEST manmade storage cavern at Shell Oil Co.'s Wood River, Ill., refinery is now being filled with butane. It will take 3½ months to fill the 22,000,000-gal. cavern which was cut from limestone.

Here's How the New Middle East Postings Compare

Crude—	Port	Gravity	Old Price (per bbl.)	New Prices (per bbl.) Esso	Shell	BP	Mobil
Safaniya	Ras Tanura	27.0-27.9	$1.50	1.46	....	....	1.47
Kuwait	Mina Al Ahmadi	31.0-31.9	1.67	1.58	....	1.59	1.59
Kirkuk	Banias	36.0-36.9	2.31	2.17	2.17	2.21	2.19
Mosul-Kirkuk	Tripoli	35.0-35.9	2.29	2.15	....	....	....
Bai Hassan-Jambur Heavy	Tripoli	34.0-34.9	2.17	2.03	2.03	2.07	2.07
Basrah	Fao	35.0-35.9	1.80	1.68	1.68	1.74	1.68
Iranian Heavy	Abadan	31.0-31.9	1.62	1.56	1.56	1.58	1.58
Iranian Heavy	Kharg Island	31.0-31.9	1.67	1.61	1.61	1.63	1.63
Iranian	Abadan	34.0-34.9	1.81	1.69	1.69	1.73	1.73
Iranian	Bandar Mashur	34.0-34.9	1.86	1.74	1.74	1.78	1.78
Stabilized Arabian	Sidon	34.0-34.9	2.27	2.13	....	....	2.17
Stabilized Arabian	Ras Tanura	34.0-34.9	1.90	1.76	....	....	1.80
Qatar	Umm Said	41.0-41.9	2.05	1.91	1.91	1.93	1.95

Most Middle East Postings Changed

• The reductions vary but all the major buyers had moved last week except Caltex. Big Arab oil countries may call an emergency meeting in an effort to work out plans to offset the drop in oil income resulting from the cuts.

MIDDLE EAST oil prices were still going through a shakedown period a week after the first round of cuts.

The first reduction, an Esso Export Corp. cut ranging from 4 to 14 cents a barrel, is being met in one way or another by other international companies. But only one cut as deeply as Esso.

As the prices stood last week, Esso and Royal Dutch-Shell offered Middle East oil at identical prices. Mobil, British Petroleum, and Cie. Francaise des Petroles prices for some of the same crudes were shaded higher.

The big French company, CFP, which owns a 23.75% interest in Iraq Petroleum Co., announced reductions of its prices in Iraqi and Qatar crudes at midweek. The cuts ranged from 6 to 10 cents a barrel. Still not heard from was Caltex, owned jointly by Standard of California and Texaco, and the only major lifting company operating in Middle East oil left on the fence.

The crude price cuts in every case were accompanied by reductions in product postings at Abadan and Ras Tanura. Already pressured by local government, product prices fell in Pakistan and Ceylon, but most observers believe the product cuts will be felt only east of the Suez.

The expected violent reaction on the part of Arab governments is still to come. It will certainly be felt first by negotiators for Iraq Petroleum Co., who are now talking to the government at Baghdad.

There were reports last week that the government of Kuwait had asked Shaikh Abdullah Tariki, director general of oil affairs for Saudi Arabia, to call an emergency meeting of the Arab oil-producing countries to try and combat the new reduction in income. Such a meeting of Iraq, Qatar, Kuwait, Bahrain, and Saudi Arabia would bypass the existing machinery of the Arab League, in which Nasser's United Arab Republic plays a leading part.

In Venezuela where government acted quickly with an official resolution on prices in an effort to hold off any spread of the price reduction, the move was being hailed as a model for the Arabs to follow.

Dr. Juan Pablo Perez Alfonzo, Venezuelan minister of mines and hydrocarbons, said flatly that there would be no cuts in posted prices in Venezuela (OGJ, Aug. 15, p. 83). Then he quickly applied himself to the far more important problem of curbing discount sales of Venezuelan oil.

The Perez Alfonzo resolution, approved by Venezuela's Council of Ministers, is based on the conservation provisions of the country's oil law plus the general sovereign power of the government to regulate its own natural resources.

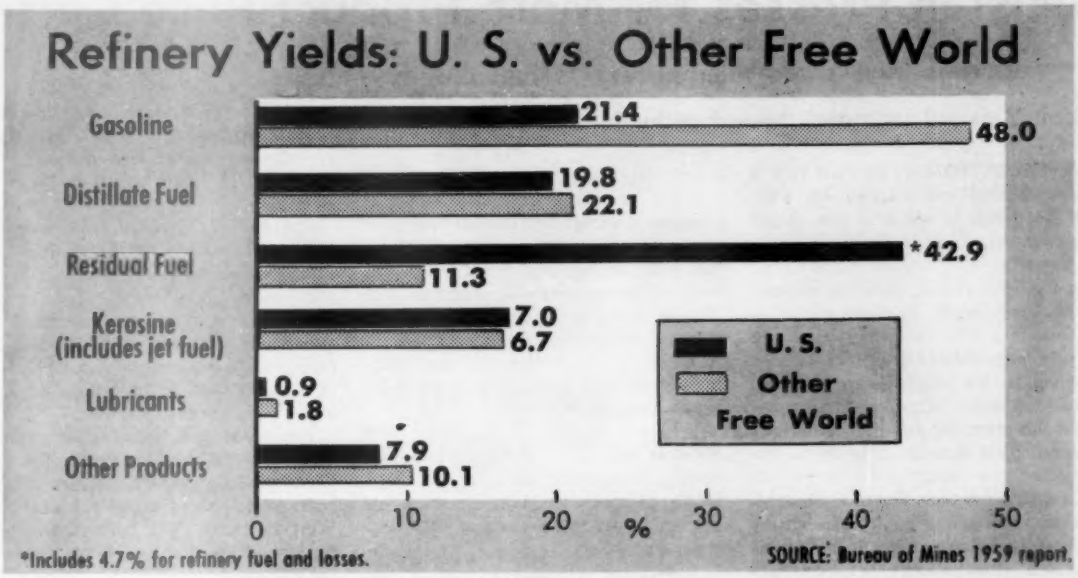
"Excessive discounts in the sales of hydrocarbons constitute economic waste harmful to the national interest and could provoke deterioration of prices in the international market," the resolution says in part.

"Therefore, this ministry will order suspension . . . of production intended for sale at lower discounts as determined by the Coordinating Commission of Conservation and Commerce of Hydrocarbons, which will be charged with the responsibility of making recommendations after analyzing the cases under investigation."

Explaining the Venezuelan stand, Perez Alfonzo said each case would be considered individually by the coordinating commission.

The minister said last week there are two kinds of discounts:

. . . **Commercial discounts** or those which a company might be expected to make in order to meet competition in its traditional market. As an ex-



Heavy Crude Is Heavyweight of Foreign Market

THE Middle East price cut is showing up the growing strength of heavy crudes in foreign markets.

Saudi Arabia's 27 to 27.9°-Safaniya crude, the heaviest sold in the Persian Gulf, is weathering the price cuts best with posted reductions of 3 and 4 cents per barrel.

This reflected the strong selling position of Safaniya oil in foreign markets where refineries are turning out four times as much residual from each barrel of crude as processing plants in the U. S.

Significantly, the lightest crudes are taking the worst beating. All crudes taking the maximum 14-cent per barrel cut posted by most companies were 34° gravity or above. This includes Kirkuk, Mosul-Kirkuk, Bai Hassan-Jambur heavy, stabilize Arabian and Qatar crudes.

The exceptions were 34 to 34.9°-gravity Iranian crude and 35 to 35.9°-Basrah crude, both of which are sold from terminals at the head of the Persian Gulf. These took 12-cent reductions. Crude in the middle range of gravities for the Middle East took the median price cuts. Kuwait's 31 to 31.9°-oil, sold at Mina al Ahmadi, dropped 9 cents while Iranian heavy, also 31 to 31.9°, dropped 6 cents at Abadan and Kharg Island terminals. If the 4-cent and 14-cent cuts stick for Saudi Arabia's Safaniya and Arabian mixture crudes, the price spread between the two oils will be reduced from 40 to 30 cents per barrel.

ample, he said low tanker rates today are permitting oil producers in other parts of the world to invade traditional Venezuelan markets. Cutting prices to meet such competition would be permissible, he said.

. . . **Political discounts** such as those offered Cuba by Russia will not be permitted by Venezuela.

Iraq is touchy . . . A team of negotiators headed by G. H. Herridge, managing director of Iraq Petroleum, started a new series of talks with the Iraqi Government in Baghdad last week and will no doubt be castigated for the price cuts.

The Iraqi atmosphere had cleared somewhat before the price cuts were announced, but the prospect of reduced income for the still shaky revolutionary regime is certain to bring a new round of public and press condemnation for the oil company.

IPC shut down Rumaila field temporarily in southern Iraq when local port officials at Fao set up a new and much higher schedule of port fees for tankers. The cut in oil production caused a concerted howl from the fiercely nationalistic press in Iraq and the company resumed production at the field after Fao officials did not enforce the new port fees.

The public furore over that situation had just about died down when the new price crisis arose right before the start of official company-government talks.

The company will not divulge publicly what the Iraqis are demanding but relinquishment of a large part of the concession area, revision of the profit-sharing agreement, and speedier "Iraqization" of the company are points under discussion.

Oil revenues . . . Production in the Middle East is steadily rising but it is doubtful if this year's rise will compensate for the price reductions. Last year the governments of the Middle East's oil producing countries received $1,236 million in income directly from oil. In most cases the oil money was just about all the income the treasury could count on.

The income ranged from $13 million in little Bahrain, which produced just under 16½ million barrels, to the whopping $345 million which oil poured into the Kuwait treasury.

Income and 1959 production (in parenthesis) for the other Middle East producers was as follows:

Saudi Arabia, $315 million (399.8 million barrels), Iran, $258 million (344.8 million barrels), Iraq, $252 million (311.1 million barrels), Kuwait, $345 million (504.8 million barrels), and Qatar, $53 million (61.4 million barrels).

Pakistan Presses for More Product Price Cuts

- **Importers have sliced their prices 7% but they are being asked to match recent reductions in India.**

INTERNATIONAL oil men kept a price-conscious eye cocked on Pakistan last week to see if a new round of reductions would be made on product imports.

In the first round, product importers—Burmah-Shell, Stanvac, and Caltex—made a 7% cut which they say was made possible by lower postings at Abadan, the big Iranian refinery.

But Pakistanis see a connection between the price cut and their country's acceptance of Russian help in oil exploration.

They are pressing for a further reduction to match a cut of more than 11% on laid-down prices in neighboring India. Bitter rivalry between Pakistan and India may heighten the problem because lower prices in India potentially are a political football in Pakistan.

Pakistan spends about $47 million a year on product imports. The country has no major refinery. A small plant in northern West Pakistan handles domestic crude output. Demand last year averaged about 28,000 bbl. daily. The pattern of imports will change abruptly in 2 years, however, when a 30,000-bbl. refinery opens at Karachi. Caltex, Stanvac, and Burmah-Shell will own 60%, and Pakistani interests the rest.

Russian aid . . . Pakistan candidly admits it accepted an offer for Russian exploration assistance to stir competition between the Soviets and western companies.

Russia offered to help explore for oil in Pakistan 2 years ago, but the offer was not accepted until now. The change of mind was caused by a slackening exploration pace by private companies, and Russian drilling success in the Cambay area of India. The Karachi Government also believes the presence of Russia in Indian oil affairs was, in large measure, responsible for price cuts won by New Delhi.

Pakistan is expected to set up an agency similar to India's Oil and Gas Commission, which operates its own concessions independent of private companies. A five-man Russian delegation will arrive in Karachi soon for preliminary discussions. Soviet aid at first is expected to be limited to geological and seismic work.

American and British companies have spent $75 million in exploration in the past 13 years. No major oil has been found, but a big gas field at Sui, West Pakistan, has been found and developed by Pakistan Petroleum, a subsidiary of Burmah Oil. Other companies in the country are Royal Dutch-Shell, Stanvac, Tidewater, Hunt, and Sun. Hunt has discontinued its drilling operations, while Sun has yet to drill a test.

Colombia Wants to End Forest Oil Contract

COLOMBIA'S national oil company has asked Forest Oil Corp. to break a contract on a secondary-recovery project in the DeMares concession area.

Ecopetrol says its management under the old government regime had no right to make operating agreements with private companies on government concessions. In addition to the Forest Colombian Corp. water-flood program, farmout contracts are in force with Cities Service, Mecom, and Benedum. The Forest program is taking the brunt of the criticism.

The Bradford, Pa., company produces about 1,000 bbl. daily of crude from old fields in the DeMares area, which reverted to the government in 1951. Ecopetrol and Forest put up operating capital on a 50-50 basis. Crude petroleum is split 62.5% for Ecopetrol, and 37.5% for Forest. A 30-year contract has 26 more years to run.

Cities Service and Richfield Oil have drilled several producing wells in the El Carare area on a farmout from Ecopetrol. Cities Service, the operator, and Richfield are putting up 75% of the capital. They will pay an 18% royalty, 5% more than the rate specified in the existing oil code.

Mecom and Benedum also have 75% farmout agreements on Ecopetrol acreage. Mecom has agreed to pay a 5% overriding royalty, and Benedum, with less accessible acreage, a 4% override. Neither has production.

Ecopetrol financial troubles may underlie its antagonism. The company's net has been falling and it is contributing less to the government treasury each year. It also is carrying on an expensive wildcatting program on its own. Cancellation of the operating agreements would be a way out of some financial obligations.

Oil Found Just North of Spanish Sahara

A MOROCCAN discovery has injected excitement into budding exploration play in the nearby Spanish Sahara.

AGIP, a subsidiary of Italy's ENI, reportedly made the find on its 14,000-square mile Tarfaya concession covering the entire length of southern Morocco, including the offshore waters. The reported find is at Oum Doul, 185 miles from the Atlantic Coast and a few miles north of the Spanish Sahara border.

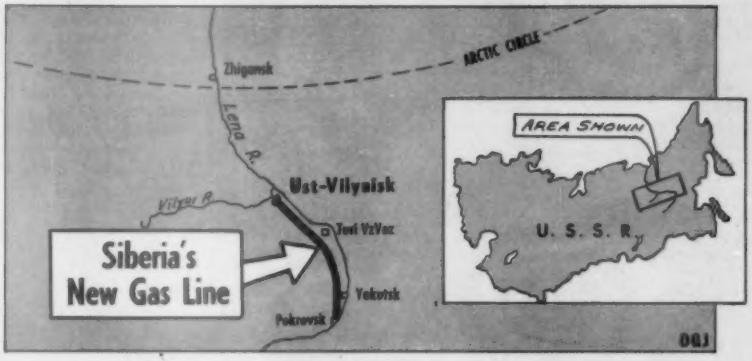
Results of tests on the wildcat were not immediately learned.

Nearest of the 13 groups with Spanish Saharan rights is Pan American. Pan Am holds Blocks 5 and 6 along the northern border on a 50-50 basis with Spain's INI. Other concession holders in the northern tier of blocks are Phillips, with Block 4, east of Pan Am acreage, and Sohio and Tidewater, with Block 7, west of Pan Am.

Union Oil of California holds Blocks 1 and 2 running inland from the coast, while CEPSA holds Block 3.

The vanguard of exploration programs that will cost $6 million in 6 years is now getting started. Gulf Oil and CEPSA have a rig enroute for a test on one of two coastal blocks, No. 47 or 51. Gulf and CEPSA jointly hold three other inland concessions.

Sohio and Tidewater have started geophysical work on nine blocks, which they have pooled. Pure Oil, Sun Oil, and Champlin Oil and Refining plan to start immediate work on a year-long seismic program. The companies jointly hold a 75% interest in a 1,388,000-acre concession.



Soviets to Tap Gas Field for Frontier

RUSSIA will open its only important gas production in northeastern Siberia with a 250-mile pipeline to the frontier cities of Yakutsk and Pokrovsk.

The line from Ust-Vilyuisk field, less than 200 miles from the Arctic Circle, will run southward closely following the Lena River. The field is on the same latitude as Central Alaska, and the route is over permanently frozen ground.

In addition to the trunk line to Yakutsk and Pokrovsk, feeder lines will supply gas to villages in the Lena River Valley. Completion date for the system has not been set. Russian geologists estimate Ust-Vilyuisk reserves at more than 740 billion cubic feet.

French Company to Market in Britain

THE TIGHT gasoline market in the United Kingdom is due to become tighter with the entry of Total Oil Products, marketing arm of CFP.

The big French company has made the expected decision to sell gasoline in Britain under its own name. The move is part of a program to develop markets for production from Algeria's Hassi Messaoud oil field, in which CFP has half-interest.

Earlier this year the company obtained a crude sales contract in Japan and formed a marketing subsidiary in Australia.

Total Oil already sells gasoline in U. K. to private brand distributors and markets diesel-fuel and gas-oil to commercial users. It leases bulk plants at Ellesmere Port and Holehaven. Products for its planned marketing expansion are expected to come from the company's refineries in France.

Competitive pressure from independent marketers shopping abroad for bargain prices recently forced U. K. gasoline prices down a penny-a-gallon (OGJ, July 18, p. 83).

Turkish Strike Gets Better

ACID TREATMENT on a Turkish oil strike by Mobil International has turned the well into a 1,200-bbl. daily producer.

Bulgardag 1 flowed 38.9°-gravity, low-sulfur crude without water through a 3/8-in. choke. This confirmed the find as the biggest ever made in Turkey. Before acidizing and fracturing, the well flowed 240 bbl. daily from about 4,700 ft.

The discovery is 40 miles inland from the Mediterranean port of Mersin, where a 65,000-bbl. refinery is under construction. Mobil, leading marketer in Turkey, has 56% interest in the plant.

Several deliniation wells are planned this year. The structure is in Adana basin, where Mobil holds exploration licenses on almost a million acres.

Bulgardag 1 is Mobil's first discovery in the area. It has drilled three dry holes and has conducted an extensive seismic program which started five years ago.

FOREIGN BRIEFS . . .

A Philippine refinery has been contracted to French companies and Procon, Inc. The 10,000-bbl. refinery will be built for local interests and Gulf Oil Corp. The French construction firms are Agricole de Vente a l'Etrange, Constructiones Metallique de Provence, and Soc. de Ateliers et Chantiers de la Seine Maritime.

New geological surveys have been started in Australia by the Bureau of Mineral Resources. The mapping programs are in the Bowen basin of eastern Queensland and the Rawlinson area which is near the eastern boundary of Western Australia.

Maleic anhydride facilities with a 10,500,000 lb. per year capacity will be built by Ste. Anonyme Reichhold Beckacite, France, an affiliate of Reichhold Chemicals, New York, at Niort, Deux-Sevres. The plant will be designed by Scientific Design Co., Inc. and constructed by Ste. Francaise des Services Techniques S.a.r.l., Paris.

A series of medium-depth stratigraphic wells is planned in the East African country of Kenya by BP-Shell Petroleum Development Co. A portable Forasol rig, rated at 6,000 ft., will drill the first test on Tana River, 30 miles south of Bura.

A 93-mile 8-in. products pipeline, from Tehran to Qazvin in northern Iran, is opening this month. The section is a northwestern extension of the products system from Abadan refinery to Tehran. Construction contract for the final 8-in. section, a westward extension of the system from Shahroud to Meshed, has been awarded to Williams Bros. (overseas), Ltd.

A 110-bbl. daily find in northern West Germany has been made by Gewerkschaft Elwerath and Mobil. The well, Wehrbleck-Ost 2, between Bremen and Minden, flowed 33°-gravity crude from a 69-ft. section topped at 2,690 ft.

A major Australian marketing company, Ampol Petroleum, has an option on a refinery site in Queensland, where it already operates bulk storage facilities. The company is the parent of Ampol Exploration, which has an interest in the WAPET exploration program in Western Australia.

A Barbados refinery at Bridgetown has been expanded to 1,000 bbl. daily capacity. The expansion was started in January when Mobil International acquired an interest in a local marketer that owned the plant, Barbados Union Oil Co. Products will be marketed under the Mobil name.

CONTROL OF DRILLING-WELL COSTS			DRILLING-WELL COST STATEMENT		
			DOLLAR COST		OVER (+)
ITEMS	OPERATOR	CONTRACTOR	ESTIMATED	ACTUAL	OR UNDER (−) EXPENDITURE (%)
EXCLUSIVE CONTROL – OPERATOR (47. %)					
1. LOCATION AND ROADS	X		$	$	(−) %
2. SPECIAL EQUIPMENT REQUIREMENTS	X				(−)
3. CASING PROGRAM	X				(+)
4. MUD PROGRAM	X				(+)
5. CORING, D.S.T., LOGGING, ETC. PROGRAMS	X				(0)
6. OTHER THIRD PARTY SERVICE	X				(−)
7. WELL MATERIALS AND EQUIPMENT	X				(0)
8. HOLE DEVIATION RESTRICTIONS	X				(+)
EXCLUSIVE CONTROL – CONTRACTOR (18. %)					
9. RIG UP & TEAR DOWN COSTS		X	$	$	(0) %
10. RIG OPERATING COSTS & EFFICIENCY		X			(0)
11. DRILLING TECHNIQUE		X			(0)
JOINT CONTROL – OPERATOR & CONTRACTOR (35. %)					
12. DRILLING RIG EQUIPMENT	X	X	$	$	(0) %
13. RIG MOVE COST	X	X			(0)
14. HOLE SIZE PROGRAM	X	X			(0)
15. CROOKED HOLE PROBLEMS	X	X			(+)
16. DRILLING HAZARDS	X	X			(+)
17. DRILLABILITY OF FORMATIONS	X	X			(0)
				TOTAL OVEREXPENDITURE	(+) %

WHEN COSTS go over the estimates, it is important to know precisely where the responsibility lies. In only 18% of the items does the drilling contractor have complete control. Fig. 1.

How to program your well and reduce costs by using

DRILLING ANALYSIS CHARTS

BY O. E. MECHEM

IN DRILLING-ANALYSIS charts, oil-company management has one of its sharpest tools for reducing costs.

These charts induce good programing, and **good programing is the key to reducing drilling costs.** Good programing results when management can:

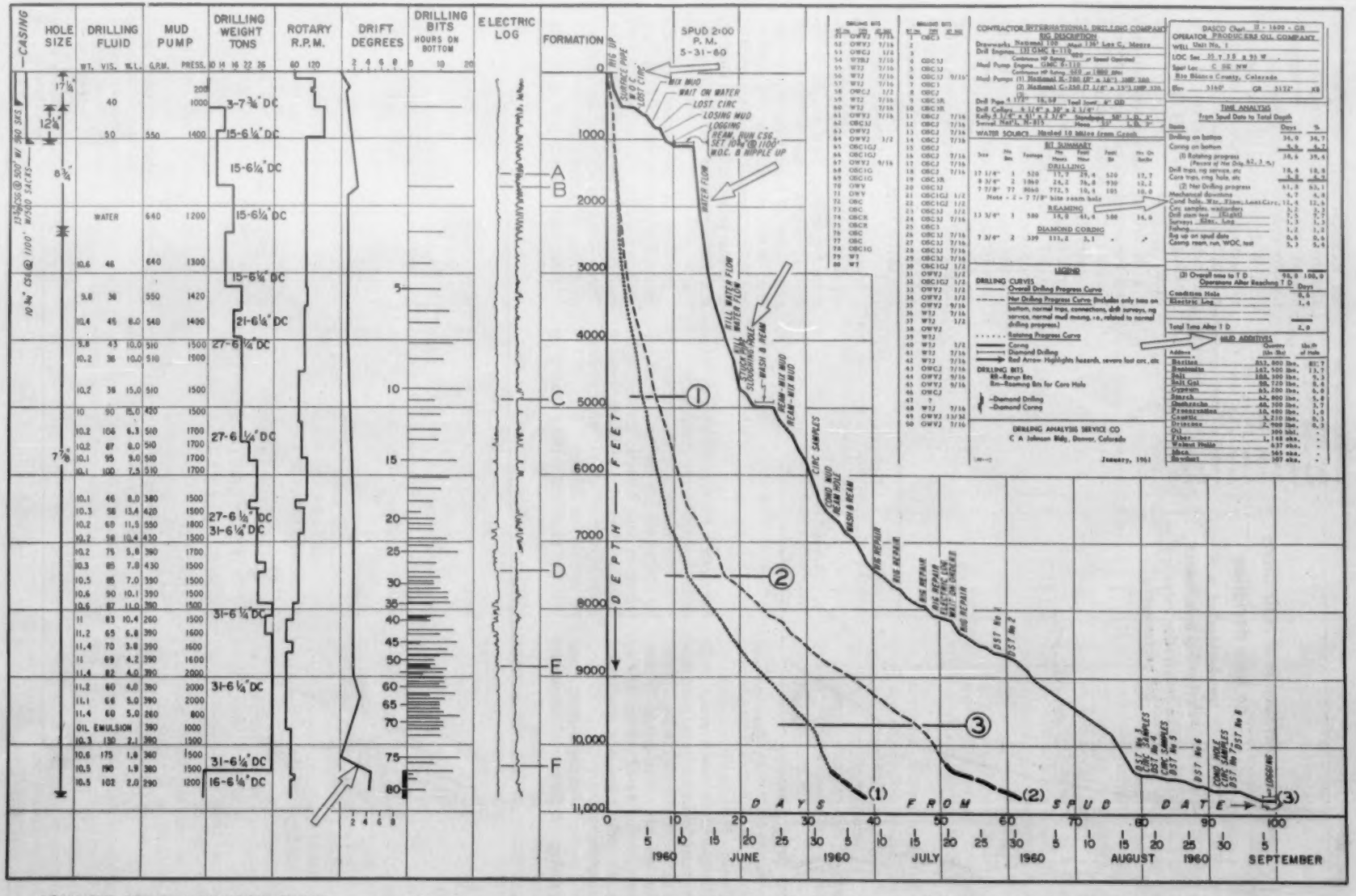
1. Analyze thoroughly each drilling operation and program.
2. Appraise the drilling-contractor's performance.
3. Spot the factors which need improving.
4. Determine whether responsibility for unusually high or low costs lies with operator or contractor.
5. Direct staff studies to improve well planning.
6. Make certain that the staff is putting to practical use the latest in research findings.

The author and his company

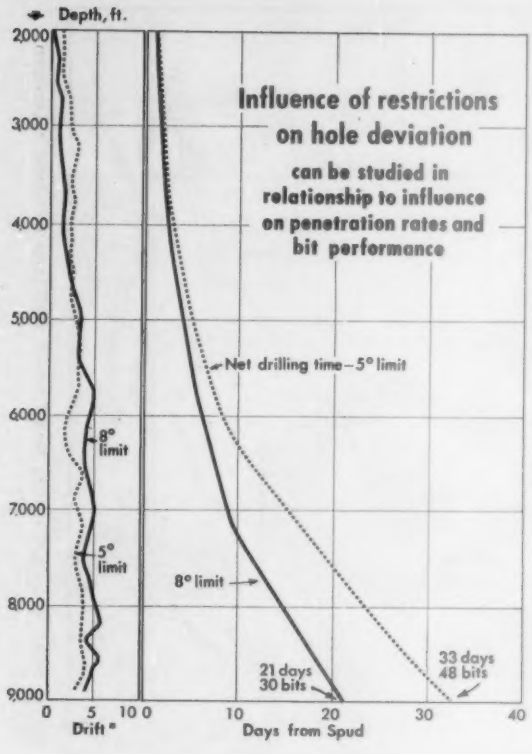
O. E. Mechem is vice president and general manager of Drilling Analysis Service (DASCO), Denver. The company is a rare, if not unique one—it both publishes drilling charts and acts as drilling consultant to operators and contractors. Founded 10 years ago by E. A. Polumbus, Jr., the firm started a drilling-chart service in the Rocky Mountain area. Aim was to provide regional information and well control. Since that time, the company has flourished and has now charted some 1,500 wells grossing more than 11,000,000 ft. of hole drilled in the Rockies, Canada, South America, North Africa, and the Near East.

With such a background, DASCO has had excellent opportunity to appraise drilling programs and analyze costs. The company's conclusions, as outlined in this article, have important lessons for all, including those outside the area served by the firm.

Mechem has been with the company since 1958. Prior to that time, he was a vice president and Rocky Mountain manager of Delta Drilling Co. He received his training with Shell Oil Co. and Standard Oil Co. of California in assignments that took him to many parts of the oil-producing world. Mechem is a graduate in petroleum engineering from Stanford University and is a registered professional engineer in Colorado and Texas.



COMPLETE DRILLING-ANALYSIS CHART sums up into one easily used package all the important details and statistics about the well. Note the three time curves, the middle one of which is a "net drilling time," which facilitates comparison between wells. Fig. 2.



COMPARISON of actual case histories in the same field. When the maximum allowed on hole deviation was raised from 5° to 8°, 12 days and 18 bits were trimmed from the prior requirements. Fig. 3.

Drilling-analysis charts make these things possible. In addition, good programing helps the contractor as well as the operator. The sound drilling program will foresee those drilling techniques which get best results and save most money.

Besides the advantages from good programing, drilling-analysis charts have other features which can mean dollar savings to the company:

1. One analytical drilling chart may be substituted for the basic data contained in tour reports; drilling-report summary; special reports, etc.; over-all drilling-progress curve; and memory for operational details.

2. An analytical drilling chart gives the technical staff drilling-well data already analyzed, correlated, and condensed, ready to apply immediately for cost reduction and other studies.

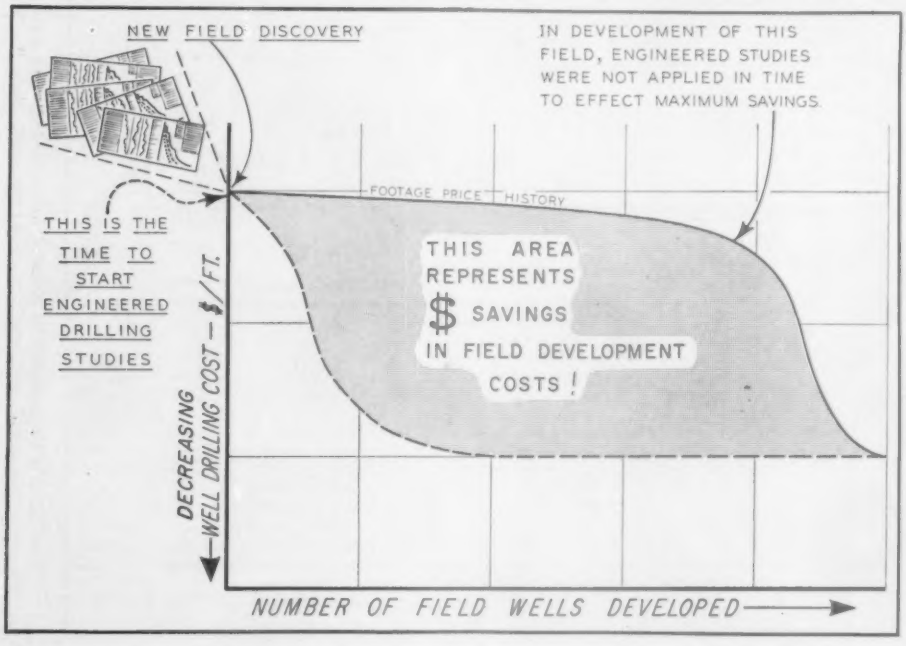
3. With analytical drilling charts in the company files, technical and clerical staff make better use of their time for their respective functions, thus increasing the volume of productive work.

4. A drilling chart placed in each well file provides a permanent drilling history that (a) is self-contained, (b) is an unabridged record, (c) is a final digest, (d) embraces the entire operation, (e) is an excellent means of analyzing operators and contractors programing and operations, (f) is a sound basis of analyzing technical details of the operation, (g) is reliable for accuracy and completeness, (h) is standardized in form, and (i) is immediately available in the well file in convenient and usable form.

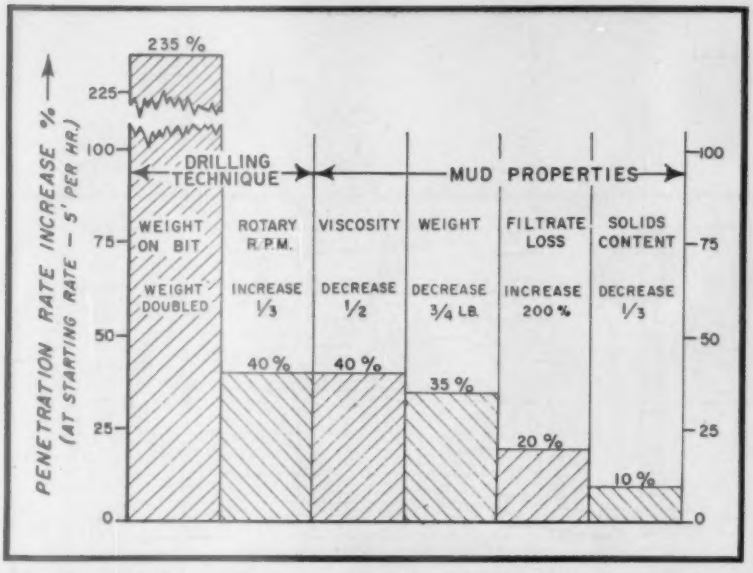
Two-sided problem. There are two types of problems in setting up a program for drilling. First are the conditions of nature at the individual location. Some of these natural problems are: structure, lithology, formation drillability, formation fluids, hazard of abnormal pressure, steep dips, faulting, etc. These problems call for the geologist.

Problems of the second type are those of performing the actual drilling, such as selecting the casing, hole, and mud programs, and many other details. These problems call for the engineer or drilling superintendent.

Thus, you can see that good pro-


NEW FIELD DISCOVERY
IN DEVELOPMENT OF THIS FIELD, ENGINEERED STUDIES WERE NOT APPLIED IN TIME TO EFFECT MAXIMUM SAVINGS.
FOOTAGE PRICE HISTORY
THIS IS THE TIME TO START ENGINEERED DRILLING STUDIES
THIS AREA REPRESENTS $ SAVINGS IN FIELD DEVELOPMENT COSTS!
DECREASING WELL DRILLING COST — $/FT.
NUMBER OF FIELD WELLS DEVELOPED

WELL-DRILLING studies should be made after the discovery is made. Usual pattern is for footage price to decline only slightly until such a study is made late in the life of the field. Fig. 4.



BEST WELL PROGRAM can be determined when it is known how much drilling rate is affected by several factors. These are actual field examples of how drilling technique and mud properties affected drilling rate. Fig. 5.

graming depends on the joint efforts and cooperation of the production, drilling, and geological departments. And, a good program is a compromise between the maximum that each department would like to include, balanced against the economics of the project.

Setting this balance is a function of management.

To improve the drilling program, it is important to understand which factors affecting drilling cost are controlled by the operator and which by the contractor. Fig. 1 shows the operations involved in a complete drilling program. These operations are divided into 17 categories.

Of the 17 items, the operator has exclusive control over 47% and the contractor has exclusive control over 17%. Jointly, they share control of the remaining 36%.

Not all of the individual items carry the same weight or influence. Effect of each on over-all performance and cost varies, of course, from well to well.

Our engineers have found, however, that it is quite possible to find from the drilling-analysis charts how many of the controlling items affect drilling performance and, therefore, well cost. Generally, these factors can also be identified as over or under or accurately forecast expenditures on the cost statement (Fig. 1).

Thus, drilling-analysis charts are of immeasurable aid because they permit one to go behind the scenes and ferret out basic causes and related factors in over or under expenditure which shows on the chart.

Dollar figures alone on a cost statement do not provide this knowledge, which actually is essential to improving programing.

DASCO drilling charts. Fig. 2 is a current DASCO-copyrighted drilling chart. In actual size, the vertical scale is 1 in. to 1,000 ft. and the horizontal scale is 1 in. to 10 days.

Three separate depth-time curves show what was done on the operation. Curve 1 is cumulative rotating-on-bottom time and is particularly useful for studying drilling techniques.

The middle curve (2) was developed by DASCO and is *net drilling time.* It consists of rotating-on bottom time, plus trip time, changing bits, rig servicing, and normal mud mixing. In other words, it is a pure drilling curve from which is removed all operations that represent variations in programs between wells. Thus, it is a yardstick by which we can compare drilling performances of various wells. In fact, this curve has made it possible to forecast net drilling time with accuracies of some 95%.

The right-hand curve (3), over-all drilling time, carries pertinent details of the operation.

Left-hand portion of the chart describes how it was done. This includes casing and hole program, drilling-fluid details, mud volumes and pressures, drilling weight, rotary r.p.m., hole drift, and drilling-bit details such as depth pulled, hours run, type of bit and number of jet nozzles. Also there are electric log and formation marker tops.

In the upper right-hand portion of the chart are details on the rig, drilling and completion operations, bit and coring summaries, and mud additives.

How management uses. Let us examine just how management uses the drilling charts in conjunction with the well-cost statement for: (1) analyzing the drilling operation and program, (2) appraising the drilling contractor's performance, (3) identifying factors that need improvement, (4) determining well-cost control responsibilities, and (5) directing staff studies for improved well programing.

When a drilling chart is laid alongside the well-cost statement, it is only natural to examine the over-all picture first before pursuing details. The following steps might well be typical of the approach used by management familiar with the story told by drilling charts:

1. Over-all drilling time to total depth and completion time are checked against forecasts in the original AFE (authority for expenditure).

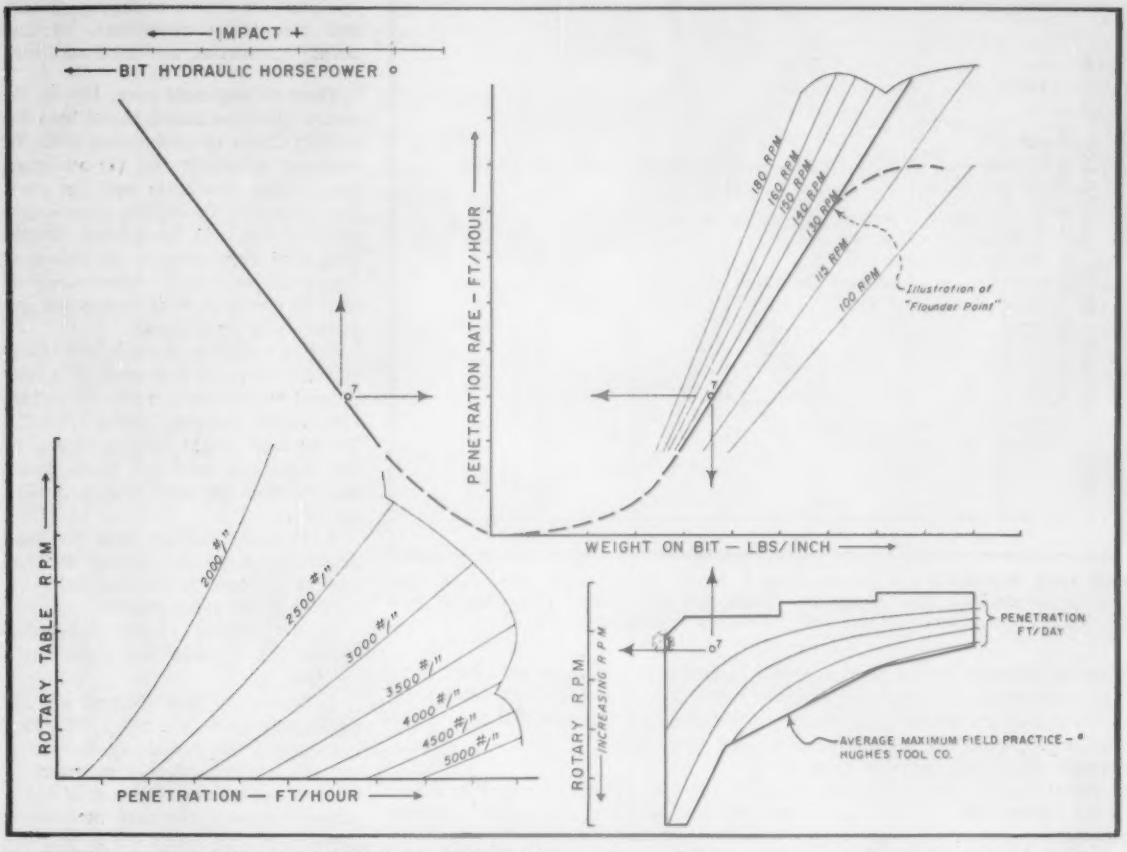
2. Net drilling time is checked against the forecast for contractor's rig time.

3. Spread between over-all and net drilling curves is next noted. This area is primarily the domain of the operator and is a reflection of programing. Certain operations of the contractor, such as fishing jobs and mechanical down time, can widen this spread but such a condition can be readily seen in the explanations on the over-all curves and in the statistical summary.

4. The contractor's performance is first examined by noting three things: (a) total area under the net drilling curve, (b) spread between net and rotating curves, and (c) statistical data on rig operations. Drilling technique followed by contractor shows in the relationships of weight on bit, rotation speed, and details of hydraulics given in the left-hand portion of the chart.

Contractor's performance should be weighed, however, in light of the drilling program prescribed by the operator. Reason is that certain factors of the program may either aid or retard the contractor's performance. In any event, drilling technology is the responsibility of the contractor and management may want its technical staff to examine the chart in detail to determine the caliber and effectiveness of drilling technique just as a contractor is interested in gleaning such information from the charts.

Paths to follow. Having obtained a feel for the over-all program and drilling performance along these lines, management then turns to examine details on the chart. These details reveal basic causes for the specific over or



BIT WEIGHT, ROTARY SPEED, AND HYDRAULIC HORSEPOWER work together to set drilling rate. This is typical of how, for some given formation, the relationships might exist. A different chart would be necessary for another formation. Fig. 6.

underexpenditures which show up in Fig. 1 correlations between well-cost controls and the cost statement. Here are a few examples to show the many avenues that can be explored in the appraisal of the program and performance. These examples show how management can quickly detect the factors needing improvement and requiring staff study before the program is designed for the next test well on the same structure or in the same general area.

1. Upon checking the over-all drilling curve from spud date, we first note that lost circulation developed soon after drilling out under surface casing. This loss got worse until the decision was reached to run an unscheduled intermediate string. These facts are reflected in casing and mud overexpenditures (Fig. 1).

If we unfold the problem graphically on the drilling chart we get a far better grasp of the statement. Seeing the how and why then leads management to a logical decision that an engineering and geological staff study should be made to avoid such a problem on future wells drilled in the area.

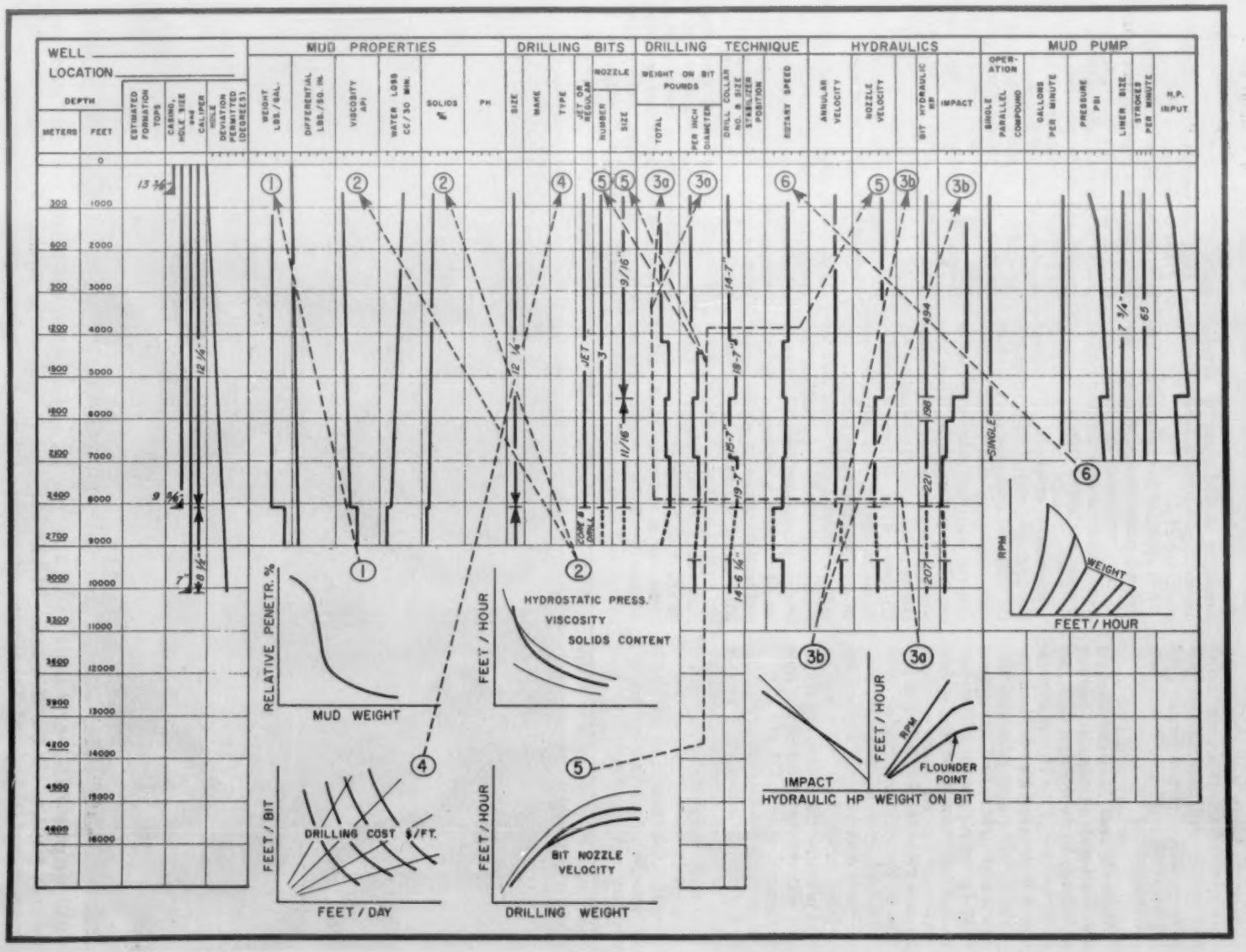
2. Following along the over-all time curve, we see that a water flow developed at about 2,300 ft. This touched off a chain reaction involving sloughing hole, extensive washing and reaming, and much mud mixing. Management would immediately raise the question: Did the engineer designing the drilling program carefully examine the history of the area and consult with the geologist as to his knowledge of any regional abnormally pressured porous aquifer? If there had been any suspicion of such water-bearing beds, the drilling program would not have permitted the contractor to drill the top part of the hole with water, which was used as the chart shows (Fig. 2).

3. Management would then note the number of cores, drill-stem tests, electric logs, and sample circulation periods taken in the well. Checking in the statistical tables, management finds that nearly one-quarter of the entire period spent on the well was devoted to these evaluation operations. This would immediately raise the question whether the balance was proper between over-all economics and the program for evaluating the prospect.

DASCO chart files contain many examples of various evaluation programs followed by different operators in the same area. Some of the programs were low in cost and still evidently satisfactorily evaluated the prospect to the company's own satisfaction. Such programs are ample evidence that good programing is a compromise between the maximum each department would like to include, balanced against sound economics of the project.

4. The drilling chart (Fig. 2) indicates that the well was drilled under a limit of 5° maximum hole deviation. When we glance at the drilling-weight and drift columns, we immediately wonder why more weight was not applied on the bit between 5,000 and 8,000 ft. There was no evidence of crooked hole above 10,200 ft.

Contractors understandably are cautious about carrying bit weights that will cause them to work too close to the contract limit on hole drift. Still, of all the factors affecting penetration rate, adding weight on bit produces the most improvement, assuming hydraulics and bit type are proper. Fig. 3 is typical of many examples in the DASCO files; it shows how penetration rate and bit consumption im-



FINAL PRODUCT of the drilling-analysis work is a chart of this type which contains the complete program for the well to be drilled. Each recommendation is balanced against all others to arrive at the most economical well. Fig. 7.

proved when higher hole drift was allowed. In this case involving wells in the same field, 12 days and 18 bits were saved to 8,900 ft. after the limit on deviation was raised from 5° to 8°.

Where faulting is not a problem and location isn't too close to the lease line, management has an excellent opportunity to initiate studies on the deviation limit. Such studies can lead to real cuts in well costs through programing which permits faster drilling as a result of more liberal hole deviation.

Studies by staff. Management might also direct study of a specific problem to be made by the technical staff. Assume that one of the charted exploratory wells discovered a new field.

Fig. 4 shows how substantial savings can be made in field-development costs by an engineered drilling program which began at the time of field discovery. The top curve, labeled **Footage Price History,** is typical perhaps of the great majority of oil or gas fields. Following discovery, footage price declines along a gently decreasing curve. Such a decline results primarily from increasing familiarity with drilling conditions and from competition.

Late in the development of the field, an engineering drilling study may be made by an operator or contractor. This study might bring an abrupt sharp decline in well costs.

On the other hand, take the operator who has been charting his exploratory wells, and may even have used available charts of other company's operations in the area. When programing for the wildcat which proved to be a discovery, he is in an admirable position to start reducing cost immediately. Management can direct staff studies which make continued improvements in programing successive development wells. Such immediate studies result in a rapid decline of well costs as depicted in the lower dashed line in Fig. 4.

It is apparent that the area between the two curves in Fig. 4 is a savings of great magnitude in development costs. Such savings are tantamount to stretching budget dollars.

Engineered programs. To design the best balanced drilling program, the technical staff should be familiar with the factors that affect penetration rate and their relative influences on drilling performances. These factors are the principal ones influencing rate of penetration: (1) Weight on bit, (2) rotary RPM, (3) mud properties, (4) hydraulics, (5) rock properties, (6) bit selection, and (7) economics.

Fig. 5 shows for a specific case the relative influences of the various factors on penetration rate. The factors are divided into drilling techniques and mud properties. Assuming proper bit selection and adequate hydraulics, the greatest influence is weight on bit, then rotary r.p.m., followed by the various mud properties.

Bit weight and rotary speed affect not only the drilling rate but also the hydraulic horsepower (or impact) needed in a particular formation. The relation between the factors is complex, but Fig. 6 shows examples of the types of relationships that may exist. These relationships can be determined from information on DASCO charts for various depths in a field (or local area of a basin) for which an engineered drilling study is being made.

Fig. 7 represents the end point of a DASCO engineered drilling study using drilling charts as the source of basic data. The small graphs labeled (1), (2), (3a), (3b), etc., are the background of research data which can be applied and made practical. If results of such a study are presented in this form to the drilling superintendent and tool pusher, he has one of the best guides to rapid cost reductions. We must recognize, however, that the first engineered drilling study is seldom the optimum or final answer. There is no reason why further charting and studies cannot continue to permit finer adjustments and improvements to be made in programing.

Forecasting costs. Another type of management directed studies is use of drilling-analysis charts to accurately forecast net drilling days and bits. With proper methods, it is generally possible for accuracies of at least 95% to be attained. Such sound forecasting provides management, on a confidential company basis, accurate cost estimates fundamental to evaluation of drilling bids, drilling deals, acreage holdings, and budgets.

New vapor-recovery unit has gone on stream at Standard Oil Co. of Indiana's 216,000-bbl. per day plant at Whiting, Ind. The new unit will process 18 million cubic feet of refinery gas daily. Eight main towers dominate the skyline. Twin towers (left) hold the refinery's fuel-gas system under pressure.

How Californians operate their water floods

West Coast operators were slow in accepting water flooding because of high-gravity oil and thick producing sections. But once they got started, there was no stopping them. This article describes current operating procedure in California floods.

A TOTAL of 84 reservoirs in 49 oil fields are now being flooded in California.

The floods range in size from 50-bbl. to 401,000-bbl.-daily water injection. Produced oil gravities vary from 11° to 39° API, permeabilities from 30 to 10,000 md., depths from 30 to 1,600 ft. and injection pressures from vacuum to 3,500 psi.

Water Source

Water used for flooding in California is obtained from three primary sources: (1) ocean water, (2) produced water, and (3) well water. Ocean water includes shallow-source wells such as used in Wilmington and the collector method used in Ventura. Produced water is water produced with oil. Well water is defined as that produced from wells other than those producing ocean water.

	Bbl. per day	Per cent of total
Ocean water	396,500	66.6
Produced water	165,600	27.8
Well water	31,000	5.2
Miscellaneous	2,300	0.4
Total	595,400	100.0

Ocean water. All water obtained from the ocean is similar in quality. Salinity is approximately 18,000 p.p.m. of chloride with a turbidity of 1-3 p.p.m., for the shallow wells, to 25-100 p.p.m. for the collector method.

No oil is found in any of the water, and pH ranges from 7.7 for shallow wells to 7.2 for the collector method.

Produced water. This varies in quality. Salinity varies from the fresh water being injected in Tejon Hills, (salinity 71 p.p.m.) to a salt water of 21,000 p.p.m. salinity being injected in Elk Hills. Most of the water has a salinity in the range of 2,250-12,000 p.p.m.

Turbidity of untreated water ranges from 15 p.p.m., as at Russell Ranch, to 140 p.p.m. being used in South Cuyama. Approximately 70% of the produced water has a turbidity ranging from 25-100 p.p.m.

Oil in the untreated water varies from a trace at Placerita to 1,500 p.p.m. at Russell Ranch. Oil concentration in most of the water is in the 25-100 p.p.m. range.

The pH of the produced water varies from 6.9 at Elk Hills to 8.2 at San Ardo with 85% of the water being above 7.0. The most common pH range is from 7.0-7.5.

Well water. The salinity of water obtained from source wells varies from 11,100-21,000 p.p.m. Sixty-five per cent of the water contained approximately 20 p.p.m. of solids.

Seventy-three per cent of the source well water was reported as containing no oil and to be in the pH range from 7 to 7.5.

Water Treatment

Source of injected water determines the type of treatment required, Table 2.

Ocean water (396,500 bbl. per day). Retention of time of all ocean waters is less than 6 hours. A large volume of the water obtained from shallow wells is desanded by cyclone-type desanders. The 500 bbl. per day obtained from an ocean collector is filtered through a diatomaceous-earth-type filter while 396,000 bbl. per day obtained from shallow wells is not filtered.

All ocean water is treated with 10-20 p.p.m. of inhibitor for corrosion control while none is treated for scale control; 146,500 bbl. per day is treated with up to 20 p.p.m. of bactericide.

Produced water (165,600 bbl. per day). Retention time of production waste waters varies from less than 6 hours (88,000 bbl. per day) to greater than 15 hours (31,100 bbl. per day) with a maximum reported time of 24 hours. Flotation is used on about half (72,000 bbl. per day) of this source. It is encouraging that 67,500 bbl. per day is injected without filtration. Sand filters are used on 21,700 bbl. per day and diatomaceous-earth-type filters on 76,400 bbl. per day. The average filter rate is about 0.5 g.p.m. per sq. ft. of surface area with a usual filter cycle of 1 or 2 days.

About half (76,400 bbl. per day) of the produced water is treated with

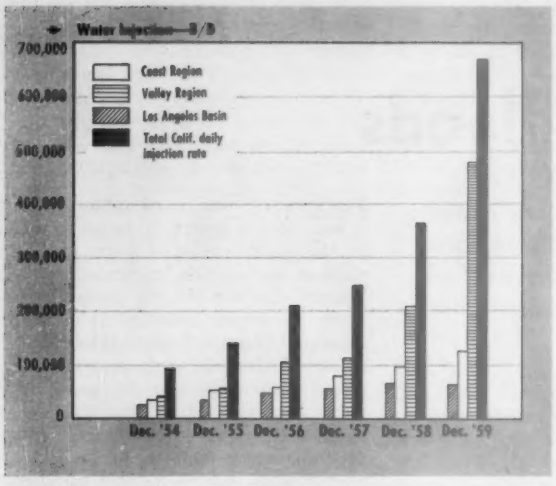
About water flooding in California...

Water flooding in California is a fairly new production technique. The first flood was started in 1944. As of January 1, 1960, 84 reservoirs were being flooded with a total of 673,000 bbl. water per day.

Because of this rapid rise in popularity, two API committees were appointed to investigate current water-flooding practices in California. These committees sent questionnaires to the companies engaged in water flooding. The results of this investigation to date are included in this article which was prepared from a paper presented at the spring meeting of the Pacific Coast District, API, under the original title "Current Water-Flood Practices in California."

The Water-Treating Practices Subcommittee had as its chairman J. A. Pryor, Shell Oil Co. Members were C. H. Jones, Jr., Long Beach Oil Development Co., and W. J. Baker, Union Oil Co.

R. K. Murdock was chairman of the Water-Injection Practices Subcommittee. Other committee members were T. D. Cramer, Standard Oil Co. of California and H. J. Krebs, Long Beach Oil Development Co.



GROWTH of water-injection usage in California.

up to 20 p.p.m. of bactericide. Most (121,400 bbl. per day) of this source is treated with less than 20 p.p.m. of corrosion inhibitor. About half (85,000 bbl. per day) of the produced water is treated for scale, primarily with a polyphosphate compound.

Well water (31,000 bbl. per day). Retention time of all of these well waters is less than 6 hours. Most of the water (22,600 bbl. per day) is filtered through diatomaceous-earth-type filters. Generally 24-hour cycles are obtained using 0.75 g.p.m. per sq. ft. of surface.

Some 22,600 bbl. per day of the source well water is treated with 10-25 p.p.m. of inhibitor for corrosion and bacteria control; 20,100 bbl. per day is treated with either acid (2,100 bbl. per day) or polyphosphates (18,000 bbl. per day) for scale control.

Filtration of waters (123,500 bbl. per day). Table 3 shows the relationship between the solid and oil content of the source waters and the filter rate and cycle times where filtration is used. Most of the water that does not require filtration (396,000 bbl. per day) (in 16 out of 24 floods) has a very low solid and oil content (less than 5 p.p.m.). Most of the filtered water has more than 26 p.p.m. of solids (109,000 bbl. per day) while only half (57,000 bbl. per day) of the filtered water has more than 26 p.p.m. of oil. Good correlation between filter rates and cycles with the solid and oil content is not evident from this survey, possibly because cycle times are based on daylight operations rather than upon reaching an optimum pressure differential across the filters.

Filters have been completely eliminated in four floods treating 45,000 bbl. per day of water (included in the unfiltered volumes in this report). Filtration is not generally required for sands having permeability above 300-500 md.

Pump package. Positive-displacement pumps with gas-engine drivers are used on most of the floods (420,-500 bbl. per day) with injection pressures up to 3,500 psi. However, there is a recent trend to centrifugal pumps with electric-motor drive (101,000 bbl. per day) on the high volume, low-pressure plants.

	Bbl. per day		
Pump package	Gas engine	Electric	Total
Centrifugal	46,000	101,000	147,000
Positive displacement	420,500	27,900	448,400
Total	466,500	128,900	595,400

Metering of injection rates. Orifice meters are used for measurement of most of the injected water.

	Bbl. per day
Positive displacement	8,000
Orifice	584,400
No report	3,000
Total	595,400

Injection rate control valves. The manually operated variable-choke valve is used on most of the injection wells.

	Bbl. per day	
	Alone	With manual variable choke
Fixed bean	75,000	80,000
(Manual) variable choke	385,000	.....
(Auto) variable choke	15,300	26,000
No report	13,500	.....
Total	489,400	106,000

Injection Well-Completion Methods

The two principal methods of injection well completion reported were (1) uncemented liner with slots or round hole perforations, and (2) cemented casing with gun or jet perforations. Twelve floods with 57 injection wells used only cemented casing with gun or jet perforations and five floods with 25 injection wells used only uncemented liners. Seven floods, with a total of 85 injection wells, have used both shop-perforated wells and gun or jet-perforated wells. Of these, four operators prefer the shop perforations, two prefer jet perforations, and one has no preference.

Uncemented liners with slotted or round-hole perforations. The water string is generally 7-in. or 8⅝-in. casing cemented at the top of the zone. No special cementing techniques were

TABLE 1—CALIFORNIA WATER-FLOOD PROJECTS

Field	No. of active injection wells	Avg. injection rate for Dec. 1959 (bbl./day)
San Joaquin Valley region		
Ant Hill	1	2,725
Buena Vista	4	1,429
Canal	4	3,173
Coalinga group	4	4,434
Coles Levee group	1	704
Cuyama group	14	67,346
Elk Hills	2	13,865
Fruitvale	1	321
Greeley	4	6,947
Los Lobos	2	1,343
Lost Hills	4	2,806
Midway Sunset	2	524
Mount Poso	4	126
Mountain View	2	1,193
Pleito	1	45
Rio Bravo	4	10,716
Rosedale	2	2,003
Rosedale Ranch	1	3,638
Strand	2	52
Tejon group	4	1,962
Union Avenue	2	313
Total	85	125,665
Coastal region		
Castaic Junction	1	402
Del Valle	3	2,534
Honor Rancho	1	163
Newhall-Potrero	3	1,028
Piru group	3	633
Placerita	13	4,959
Shiells Canyon	15	2,100
South Mountain	1	1,944
Tapia	1	103
Torrey Canyon	4	1,135
West Mountain	1	398
Casmalia	3	5,768
Cat Canyon group	10	4,788
Orcutt	6	3,998
Santa Maria Valley	2	868
Zaca Creek	4	12,435
Aliso Canyon	1	59
Simi	1	53
San Miguelito	3	1,266
Ventura	4	854
San Ardo	3	16,460
Total	83	62,948
Los Angeles region		
Belmont offshore	1	1,534
Coyote West	13	28,223
Dominguez	51	27,620
Inglewood	15	17,700
Richfield	5	6,761
Torrance	2	811
Wilmington	115	401,189
Turnbull	1	158
Total	203	483,996
Grand Total	351	672,609

August Rate barrels per day per well = 1,916.

TABLE 2—TREATMENT OF VARIOUS INJECTION WATERS

	Ocean source bbl. per day	Source wells bbl. per day	Produced water bbl. per day	Misc. water bbl. per day	Total bbl. per day
Total water	396,500	31,000	165,600	2,300	595,400
A. Filters					
None	396,500	8,400	67,500	....	471,900
Sand	.....	.....	21,700	1,300	23,000
D. E.*	500	22,600	76,400	1,000	100,500
1. Rates					
Less 0.5 g.p.m. per square foot	500	4,600	40,400	....	45,500
Greater 0.5	.....	18,000	57,700	2,300	78,000
No Reply	.....	....	....	....	.....
2. Cycle					
Less 25 Hours	.....	18,000	11,700	1,300	31,000
25-50	.....	....	52,400	1,000	53,400
Greater 50	500	4,600	14,000	....	19,100
No Reply	.....	....	20,000	....	20,000
B. Flotation	.....	....	72,000	....	72,000
C. Retention time					
Less 6 Hours	396,500	31,000	88,000	....	515,500
6-15	.....	....	46,500	1,000	47,500
Greater 15	.....	....	31,100	1,300	32,400
D. Salinity					
Less 500 p.p.m.	.....	....	1,700	1,300	3,000
500-12,000	.....	2,500	86,400	1,000	89,900
Greater 12,000	396,500	20,100	77,500	....	494,100
No Reply	.....	8,400	....	....	8,400
E. Chemical					
1. Bactericide					
None	250,000	8,400	89,200	1,300	348,900
Less 10 p.p.m.	91,000	....	22,000	....	113,000
10-20	55,500	20,100	51,900	1,000	128,500
Greater 20	.....	2,500	2,500	....	5,000
2. Corrosion					
None	.....	8,400	44,200	1,300	53,900
Less 10 p.p.m.	.....	....	67,000	....	67,000
10-20	396,500	20,100	51,900	1,000	469,500
Greater 20	.....	2,500	2,500	....	5,000
3. Scale					
None	396,500	10,900	80,600	1,300	489,300
Acid	.....	2,100	4,000	....	6,100
Poly Phosphate	.....	18,000	81,000	1,000	100,000
F. Testing					
Plugging test	.....	....	....	....	450,500
Chem. test	.....	....	....	....	352,600

*Distomaceous earth.

used. The liners are usually 6⅝-in., 5½-in. and in some cases 5-in. with both slots and round holes used. There are also a few injection wells which have been gravel-packed. In most cases, the uncemented liner completions have been producers which were converted to injection wells. The sand thickness exposed in these wells range from 40 to 1,000 ft., with an average of 135 ft.

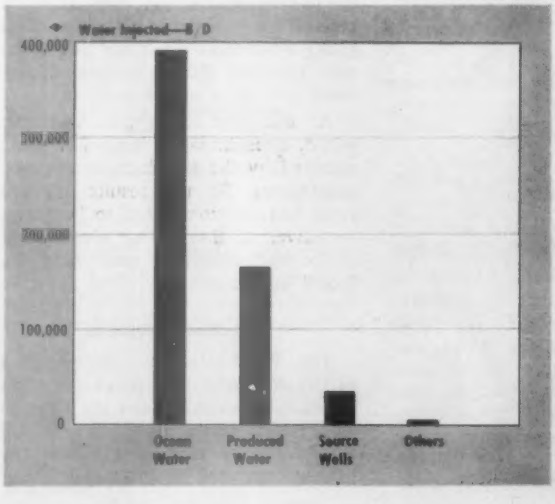
Most wells were drilled with clay-base muds. One operator uses salt water to complete injection wells located in the aquifer. Another carefully controls the pH of the clay-base mud to prevent precipitation of carbonates in the sand. The well is then swabbed until chemical analysis indicates no further mud filtrate is being recovered.

In the case where an injection well is a new completion, it is common practice to produce the well for a short period to clean up the sand face. A variety of methods are used to clean perforations including swabbing and washing with oil, water, acids, or solvents. One operator who solvent-washed the wells completed within the oil band, noticed a significant improvement in well injectivity.

Operators said the principal advantage of uncemented liner completions is that (1) since most wells are converted producers, it saves the cost of drilling new wells; (2) in general, they have better injection profiles and better injectivity, and (3) do not have sanding difficulties or casing failures that have occurred in cemented casing completions. The principal disadvantage cited is that there is no possibility of selective control of injection with packers.

Cemented casing with gun and jet perforations. Most of the wells have 8⅝-in. and 9⅝-in. casing cemented at the top of the zone. Then 5½-in., 6⅝-in., 7-in., or 7⅝-in. casing is cemented through the zone and gun or jet-perforated. Some operators have run a single string with a large-diameter pipe on the top and small-diameter pipe on bottom instead of both a water and oil string. Both bullets and jets have been used for perforating, but most operators prefer jets. One operator cited an indication of casing damage from gun perforating as the reason for this preference. The normal perforation density varies from one to four holes per foot, with an average of two holes per foot. Two operators have attempted varying the perforation density from one hole per foot to as low as one hole per 10 ft. for selective control of injection. This technique apparently was not successful. Normally, blank intervals are left between the perforated sand intervals so that packers can be subsequently installed for selective control of injection. Some operators test the cemented blanks for segregation.

Both a one and two-stage cementing job are used for the oil string with no special techniques reported. Low-water-loss clay muds, salt-water muds, and oil-base muds have all been used in this type of completion. One operator prefers oil-base-mud completions over other methods. Another oper-



WATER SOURCES for California water-injection projects.

ator, however, believes a low-water-loss clay mud is superior.

Before completion, an attempt is generally made to clean perforations by backwashing, swabbing, washing, or producing the wells.

Injection Data

Of the 24 floods studied for this survey, the operators in 16 floods attempted one or more of the various methods to improve injectivities. The following table summarizes methods and results for these floods:

Stimulation method—	No. of floods	Results
Acidizing	10	Successful for temporary improvement in most cases. Failed for three operators.
Back flowing	4	In general, successfully improved injectivity in unconsolidated sands.
Swabbing	4	In general, good.
Suction wash	2	One success, one failure.
Increased injection pressure	2	Good results.
Sand-water fracture	1	One of three fractures was successful, increasing injection from 100 to 2,000 bbl. per day.
Surfactants	3	Temporary benefit.
Pressure wash	1	No improvement.
Formation tests	5	Good results.

Acidizing with inhibited hydrochloric acid is the preferred stimulation method by most operators. Wilmington field operators obtain good increase in injectivities by the formation test method. A regular formation tester is opened above the desired zone allowing fluid and sand to backflow from the formation into empty drill pipe. The technique has not been successful on competent formations where sand will not backflow into the well.

Injection profile testing. In 19 of the 24 floods covered by this survey, the injection profile is checked routinely by means of spinner or temperature surveys. Frequency of testing varies from one test per well-month to one well per well-year; most operators check the profile twice a year for each injection well.

In three of the floods, the injection profile is checked only when required, as indicated by well performance. No profile testing is done in two floods injecting into massive aquifer sands.

Operators of 15 floods prefer spinner surveys for testing injection profiles because of the quantitative results. Some of these operators also run temperature surveys periodically to obtain qualitative checks. In general, spinner surveys are preferred in gun or jet-perforated completions.

Those operators who prefer temperature surveys cited low cost and applicability to slotted liners as their reasons.

Five operators occasionally run radioactive-tracer surveys.

Injection profile controls. Various profile control methods have been applied. Among different types of control, these were most commonly used:

1. Selective plugging agents (chemicals, resins, plastic balls, inert material, etc.).
2. Acid washes of tight intervals.
3. Various types of plugs (cement, sand).
4. Multiple packers and subsurface beans.

Nine operators have used one or more of these control methods. Results show one successful selective chemical plugging while similar jobs by the same operator failed. Both sand and cement bottom plugs were used by two operators to eliminate thief or wet sands. In general, however, multiple packers and subsurface beans seem to be the only successful methods for profile control. Seven of the operators participating in the survey reported reasonable success using one or more packers to separate sand intervals and obtain selective control of injection water.

TABLE 3—WATER TREATMENT COMPARED TO OIL AND SOLID CONTENT DIATOMACEOUS EARTH FILTERS

Rate (g.p.m./sq. ft.)	Cycle (hours)	R.p.m.	Solids-water volume	Oil-water volume	Total water volume
Less 0.5	25-50	5-25	.....	20,000	26,400
		26-100	26,400	6,400	.....
Less 0.5	Greater 50	Less 5	2,500	3,000	19,100
		5-25	.....	12,500	.....
		26-100	16,600	3,600	.....
Greater 0.5	Less 25	26-100	28,000	18,000	28,000
		No reply	.....	10,000	.....
Greater 0.5	25-50	5-25	12,000	.....	27,000
		Greater 100	15,000	27,000	.....
Without filters		Less 5	396,000	399,000	471,900
		5-25	13,500	.....	.....
		26-100	51,000	64,500	.....
		No reply	11,400	8,400	.....
With sand filters		Less 5	.....	3,000	23,000
		26-100	23,000	.....	.....
		Greater 100	.....	20,000	.....

Problems in Injection Wells

Operators were polled as to special problems resulting from water injection. Six of the floods reported no special problems. The remainder reported a variety of problems.

The most serious of the problems reported is liner collapse within the zone being flooded. This has occurred in floods with thick unconsolidated formations, primarily in injection wells with cemented, perforated casing. Collapse is usually the result of formation movement. Sanding in injection wells also seems to be a contributing factor in liner collapse. This is probably because sanding leaves washed-out areas around the well bore with subsequent formation sloughing. One operator reported partial collapse of a cemented liner in an injection well following backwashing.

Sand control is one of the advantages cited for slotted liners over gun or jet perforations in injection wells. In addition to the usual sand-control methods, it has been found that a gradual shutdown of injection wells rather than abrupt closing-in will minimize back flow of sand.

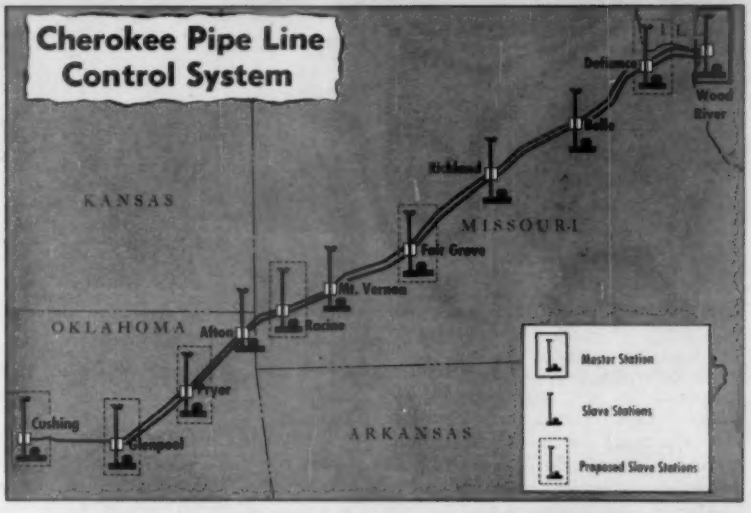
Corrosion and scale formation are common problems in injection wells. But each operator's experience has been different. Barium sulfate, ferrous sulfide, and carbonate scales have been reported. No general solution was given. Bacterial corrosion, corrosion at air-ground water contact outside the casing, and corrosion caused by a water-treating chemical (SO_2) were reported. Only one operator reported the breakdown of cement jobs as a major problem.

At the time this report was prepared, questionnaires were still being received by the members of the subcommittees. So the results are not final, but are considered to be representative, as they cover about 89% of the total volume of water being injected in California.

Acknowledgment

The Fluid-Injection Subcommittee of the API wishes to thank the California oil companies and the Conservation Committee of California Oil Producers for making available the information used in this paper.

DISPATCHING CONSOLE with push-button controls for changing operations of pumps, valves, etc. Remote station conditions are indicated on mimic board. One of the two electric typewriters is for hourly programed data logging. The other is for single-station data logging.



First solid-state

Supervisory control of pipeline

performs well

Reliability of system and life of electronic components have been satisfactory and in many respects have exceeded expectations. System was accepted by Cherokee Pipe Line in August 1959.

BY E. B. STEPHENSON,

Communications Engineer
Continental Pipe Line Co.

THE FIRST industrial supervisory control and telemetering system to use solid-state components throughout is operating on the Cherokee Pipe Line Co. products system.

Supervisory control was installed to permit remote control of the eight pump stations and two remote delivery terminals on Cherokee.

Presented at PIEA meeting, Kansas City, Mo., 1960.

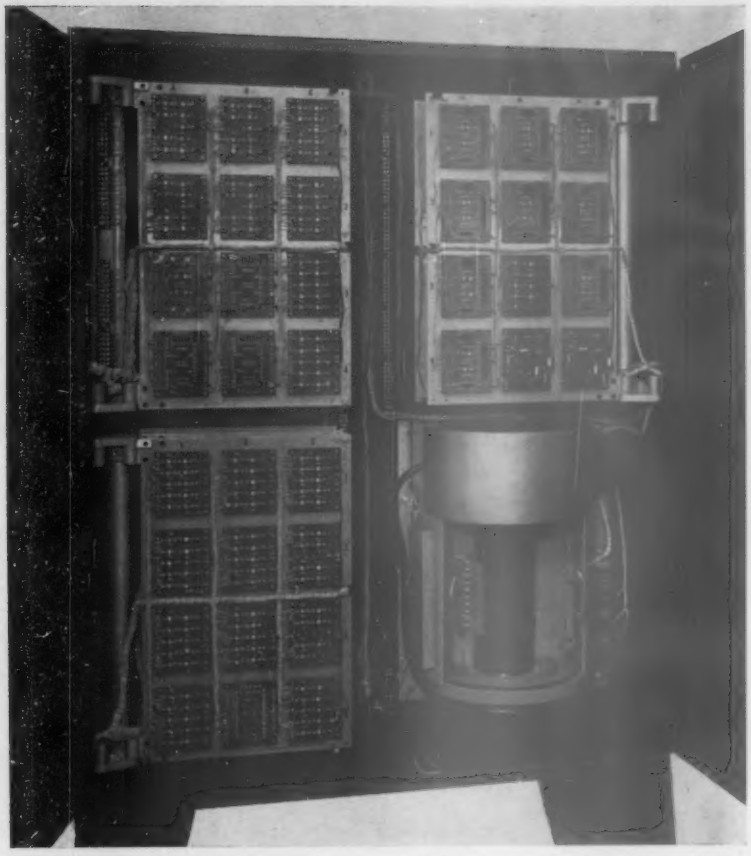
Pipeline System

Cherokee Pipe Line is owned by Cities Service Oil Co. and Continental Oil Co. The products system of Cherokee is operated by Continental. One segment of the system is used to move various refined petroleum products from refineries in northern Oklahoma to Wood River, Ill.

A 12-in. line connects Ponca City refineries to a manned booster station at Glenn Pool, Okla., where additional products are taken from refineries in the Tulsa area. Two parallel 10-in. lines extend from Glenn Pool to Wood River. At Wood River, products are delivered into terminal tankage or transferred to another pipeline system. Products are also delivered to terminals at Mount Vernon and Belle, Mo.

Electric-motor-driven pumping stations are located on each of the 10-in. lines at Afton, Okla.; Mount Vernon, Richland, and Belle, Mo. Variable-speed drives between motor and pump are incorporated for flexibility and efficiency at various pumping rates. Present capacity is about 60,000 bbl. daily.

Pump stations are locally self-protected; automatic shutdown occurs



CONTROLLING STATION master telemetering terminal and deviation detector.

when variables, such as pressures and temperatures, are exceeded beyond preset values. The pumping stations are equipped with semiautomatic electrical sequencing equipment. As an example, upon operation of a local start push button in the sequencing equipment, the station is automatically aligned, comes on stream, and regulates itself within certain preset operating parameters.

Delivery-terminal tank manifolds include motor-operated valves to permit push-button control. Positive-displacement meters are installed at delivery points to measure product deliveries from each line. With these basic local equipments, that is: local pump sequencing, local protective shutdown devices, motor-operated valves, and product meters at delivery points, the incorporation of a supervisory-control and telemetering system was logical and relatively simple.

Supervisory Control, Communications

The supervisory-control system consists, of three basic equipments: the dispatching console, the master-station equipment, and the slave-station equipment. At each of the four remote locations, the slave equipment serves two pumping stations as well as delivery facilities at Mount Vernon and Belle.

The communications channel between the master and four slave stations is a conventional party-line voice-grade circuit leased from the telephone company. The channel was first installed as a two-wire circuit but was later converted to four-wire operation for increased channel stability and isolation of control and telemetering tones.

Three tones originating at the master station on 1,500, 1,900, and 2,300 c.p.s., and two tones originating at slave stations on 680 and 1,080 c.p.s., share the single voice-grade channel. Normal amplitude into tone receivers is −20 dbm. at all locations. The equipment was designed and field-tested to meet performance specifications over the range of 0 to −40 dbm. without adjustment to assure continuous operation over amplitude ranges in excess of that expected in the communications channel.

The supervisory tone equipment was designed and field-tested for noise immunity performance. An r.m.s. (root mean square) value of random noise equal to the r.m.s value of an individual tone was the basis for satisfactory noise immunity. Although no serious communications channel problems occurred in this system, probably where high-speed data transmissions are contemplated, harmonic distortion, amplitude frequency response band-width, and phase delay of the intended communications channel should be vary carefully considered.

Dispatching console. The dispatching console located at Wood River provides push-button controls which upon actuation causes changes in operation of pumps, valves, etc. The dispatching console contains a 30-in.-carriage electric typewriter for hourly programed data logging as well as "all-station" printout on push-button demand.

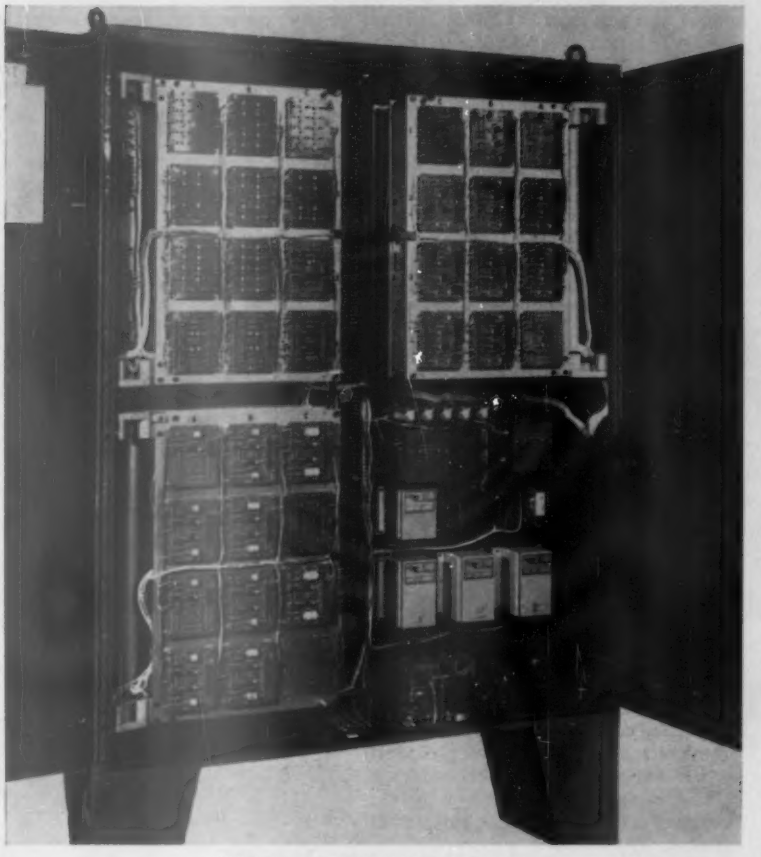
A mimic board to provide visual lamp indications of remote-station conditions is conveniently located directly above the push-button control panel. Ten possible alarms from each remote station are displayed immediately below each station mimic.

A 12-in.-carriage electric typewriter is located to the left of the control panel. This typewriter is used for single-station data logging upon deviation of pressures or pump speeds beyond preadjusted limits. Printouts caused by remote-station deviations are printed in red. On-demand single-station data logging is printed in black. To the left of the deviation printer is a continuous chart recorder of eight product indications from two locations on each line upstream and in station at Mount Vernon and Belle delivery stations.

Telemetering. All information between the master and slave stations is handled in digital form using binary-decimal digit code with an excess bit in each digit code for parity check. Precisely-measured tones of discrete duration of time represent binary "0" and binary "1" information bits and reset signals. Instructions and information are sent as coded numerical messages.

Each control station has a code address number. Each transmission from the controlling station is received by all controlled stations but only the correct station will process the message. At the controlling station the coded messages are generated either by push-button operation, from the deviation programer, or from the hourly data-logging programer.

All messages are checked at the point of reception for the proper number of bits in a digit and the proper number of digits in a message. If, for any reason, a reply is not received



UNIT for controlled (slave) station.

to a message from the controlling station, a "no reply" lamp will flash. If an incorrect message is received, an "invalid" lamp will flash and, of course, the incorrect message is rejected by the controlling station.

At the controlling station, the first transmitted signal is a reset tone which prepares all stations for a new message. Outputs of tone transmitters are then switched or keyed to the communications channels in sequence to form the coded digit or combinations of digits to form a message. Four tones or bits are transmitted to represent a particular digit. The number of "0" bits is counted and a "1" bit is added if the count is even; otherwise, a "0" bit is encoded as a "5th" bit in the digit.

In the receiver portion of a station, the incoming tones pass through filter and discriminator circuits. A counter counts the number of bits. The presence of the "0" bit will cause a latching circuit to turn off or the presence of a "1" bit at that same time will cause the other latch to be turned on. Thus, four latch outputs are converted from binary to 16 possible decimal combinations by decoding.

Data logging. Each hour a complete typewritten log of suction, discharge, and case pressures, pump speeds, and positive-displacement meter readings is automatically made for the entire pipeline system. The hourly log is made on demand of the hourly programer at the master station.

When the request for a particular reading is received at a slave station, that station goes through an analog-to-digital conversion and sends the requested data to the master station. At the master station the reading is identified with code letters and printed.

Operational speed of the printout is not limited by performance of the communication channel nor the electronic circuitry; it is regulated to coincide with speed of the electric typewriters which requires signals of 20 milliseconds time duration representing data logging at the rate of 100 words per minute. A printout, similar to that which is automatically programed every hour, can be requested at any time by the operator at the master station. The operator may, in turn, cause single-station printout on small deviation printer.

Nonprogramed operations include commands such as motor-load set points, opening and closing valves, starting and stopping pumps, etc. These commands are accomplished from the control panel at the master station. Each command is placed in the control board by push button with appropriate white lights in order that the operator may visually verify the command before execution.

The command is transmitted by depressing a transmit push button. Electronic circuitry then causes the message to be sent to the appropriate controlled station. There, the received digital pulses are converted by the slave-station equipment to a contact closure which is fed into the pump-station electrical equipment for valve or pump operation.

An analog-to-digital converter is located at each of the controlled stations. It converts the analog transducer signal to coded d.c. pulses for the telemetering system. This unit receives voltages from several transducers which are switched into the converter depending upon information requested by the master station.

The actual analog-to-digital conversion is a process of comparing a sample signal current level with precise reference currents. Individually, the reference currents represent 800, 400, 200, 100, 80, 40, 20, 10, 8, 4, 2, and 1 and are selected such that values from 1 to 999 or 0.1% to 99.9% of the analog signal can be obtained for transmission. Speed of operation is such that three numerical samples per second can be taken, converted, and transmitted with an accuracy of better than 0.02% full scale.

Deviation detection. Information relative to station suction and discharge pressures, pump-case pressure, or pump speed is printed at the dispatching console upon automatic detection of deviation beyond certain previously determined limits. The variables at all pump stations are scanned by an automatic programer approximately every 30 seconds.

Deviation detection is based upon comparison of current station data with the last printed data. If a change has taken place greater than the amount set in by previous adjustment at the controlling station, not only that particular item but all of the data for that particular station is typed on the deviation printer, in red, with an accompanying bell signal.

Throughout the scan cycle, the information pertaining to pressures and pump speeds is brought into the master station in digital form and placed on a track of the magnetic storage drum.

Another track already contains information representing the last printed data. These two informations are fed into a comparator where an error or deviation greater than that which was prescribed by the setting initiates printout of the data.

Ten alarms such as low suction, high discharge, high pump-case temperature, high motor-bearing temperature, and other operating conditions adversely affecting or causing shutdown of a pumping unit are brought in automatically from each remote location to the controlling station console. These alarms are displayed visually by lamp indications and sound an alarm horn.

The deviation programer is so arranged that an alarm at any station will be detected and displayed within 6 seconds of its initiation at the remote station. Any time that the operator desires to verify lamp indications of valves, pumps, or alarm conditions at a remote location, a station check is provided and each indication, in turn, is verified.

Part of the deviation-detection cycle which occurs approximately every 30 seconds is indication from eight product indicators. Product indicators are installed upstream and in-station on each 10-in. line at Mount Vernon and Belle, so that interfaces or change of products may be detected and displayed at the controlling station. From this information, the operator may cut in or out of the delivery terminals.

The remote product-indicator reading is fed into the remote-station analog-to-digital converter where a digital value is transmitted to the master station. Each measurement as it is received at the master station is converted to a dot position on a multipin recorder. The product-indicator measurements are subject to deviation detection the same as pressure and pump speed. However, in this case, deviation actuates a buzzer and an appropriate lamp on the recorder to indicate which line and which station has experienced the product change.

Provision is made at the controlling station for commands of set point in the motor-load controllers at remote stations. The operator merely selects the desired ampere demand and transmits that value to the station whose load is to be controlled. This transmission causes storage of that value in digital form at the station concerned, and conversion of that value to an analog quantity is set into the motor-load controller.

Ampere demand values between 000 and 999 are accommodated in steps of 1 amp. When a new value has been set in at the remote station, that value is retransmitted to the master station and will print out on the single station printer. Without causing a change in the set point, the operator at the controlling station may at any time verify and effect a printout of stored set-point value.

Power source. The normal source of power for the master and slave-station equipments is 110 volts a.c.; however, small batteries are float-charged in the slave equipment to provide 24 hours' standby power in event of commercial-power failure. There are many advantages to such operation; primarily, the storage of ampere-demand set-point and delivery-meter barrel count.

Float-charge battery operation also provides a very stiff and stable source of power to the semiconductor components which is essential to long life and trouble-free operation. The batteries, in effect, act as extremely large capacitors to power-line "spikes" and high-frequency components.

Transistors, Diodes, Vacuum Tubes

Most of the components included in this system are semiconductors and magnetic components. The use of transistors and semiconductor diodes avoid some difficulties experienced with vacuum tubes, relays, stepping switches, and other electromagnetic devices.

Assuming that proper application has been chosen in each case, we think in terms of heated filament hours as the life expectancy of a vacuum tube; we think in terms of the number of operations as the life expectancy of a relay; however, semiconductor component life depends not upon number of hours nor number of operations, but essentially upon proper application.

In order not to belittle tremendous progress and improvement in vacuum-tube production, it must be pointed out that present-day industrial tubes can withstand wide ranges of ambient temperature, severe shock, and short-term overloads. It is generally true that if a vacuum tube operates for 30 days without failure it will usually last for more than a year.

However, a vacuum tube depends upon a glowing filament and, like a light bulb, is therefore subject to instantaneous failure. Further, most tube filaments are designed to operate at 6.3 or 12.6 volts and claims are made that operating filaments at 0.1 volt higher than that specified will result in 20% shortening of tube life.

To show more clearly the significance of critical filament voltage, if a transformer designed to deliver 6.3 volts from a 115-volt a.c. source is operated instead from a 125-volt source, it will deliver more than 7 volts filament current. Transistors, unlike vacuum tubes, do not require heat to cause electron conduction and so are less subject to sudden failure, due primarily to elimination of the heated filament.

Transistor failure is characterized more by a gradual deterioration of performance to the point that a circuit ceases to function; it is due primarily to imperfections in the germanium or silicon materials used in these devices.

Unlike relays, transistors have no moving parts; however, in this system, transistors are used in similar manner: information is represented by an on-off condition of current or the passage or blocking of pulses in the electronic circuits. An attraction of semiconductor components is their smaller size on the order of one one-hundredth to one one-thousandth that of a tube or relay.

Due to low-voltage power requirements, other components such as resistors and capacitors are also of miniature physical size. As a result, extreme compactness of equipment has been achieved. All circuits are mounted on phenolic boards of 3 by 4 in. which, in turn, are attached to front and back of pivoting equipment shelves much like postage stamps on the pages of a stamp collector's book.

Extremely low equipment heat dissipation has permitted housing the master-station equipment for controlling eight remote pump stations and two delivery terminals in an enclosure 14 in. deep, 48 in. wide, and 60 in. high. Slave-station equipment is housed in an identical enclosure. The enclosure actually occupies less than 5 sq. ft. of floor space.

The dispatching console takes more floor space; however, future provisions are incorporated in the present console (and electronic-equipment space is reserved in the master equipment cabinet and tracks are available for magnetic-drum storage) to accommodate expansion to more than twice the number of existing controls.

Don't miss

"How to Program Your Well and Reduce Cost by Using Drilling-Analysis Charts."

p. 66

This automatic tow tractor even

opens and closes gates

AUTOMATIC materials handling, which lately has helped out on a lot of tough jobs, is making another one simpler.

An electronically controlled tractor-trailer combination is easing the chore of distributing boxes, crates, drums, etc., from the stores department at the Baton Rouge refinery of Esso Standard Division, Humble Oil & Refining Co.

Powered by a storage battery, the tractor will tow as many as five trailers, each with a capacity load of 4,000 lb., along a predetermined loop. No driver is required.

There are two loops in Esso's building. One serves the storage area; the other brings the trailer train to a point convenient for pickup and delivery by other departments.

The trailer train will stop automatically at as many as 16 delivery points and it moves at about 2¾ m.p.h. When operated manually, the speed can be boosted to 3½ m.p.h.

How it works. Insulated wires embedded in the concrete floor carry signals which control the tractor's movement around the two loops.

Service points along the route called beacons, each emit a characteristic signal which is picked up by a sensing device located on the tractor. The control mechanism can be set to stop the train at any or all of the 16 beacons. The train may also be allowed to orbit continuously around the loop, or it may be driven to any point by manual operation.

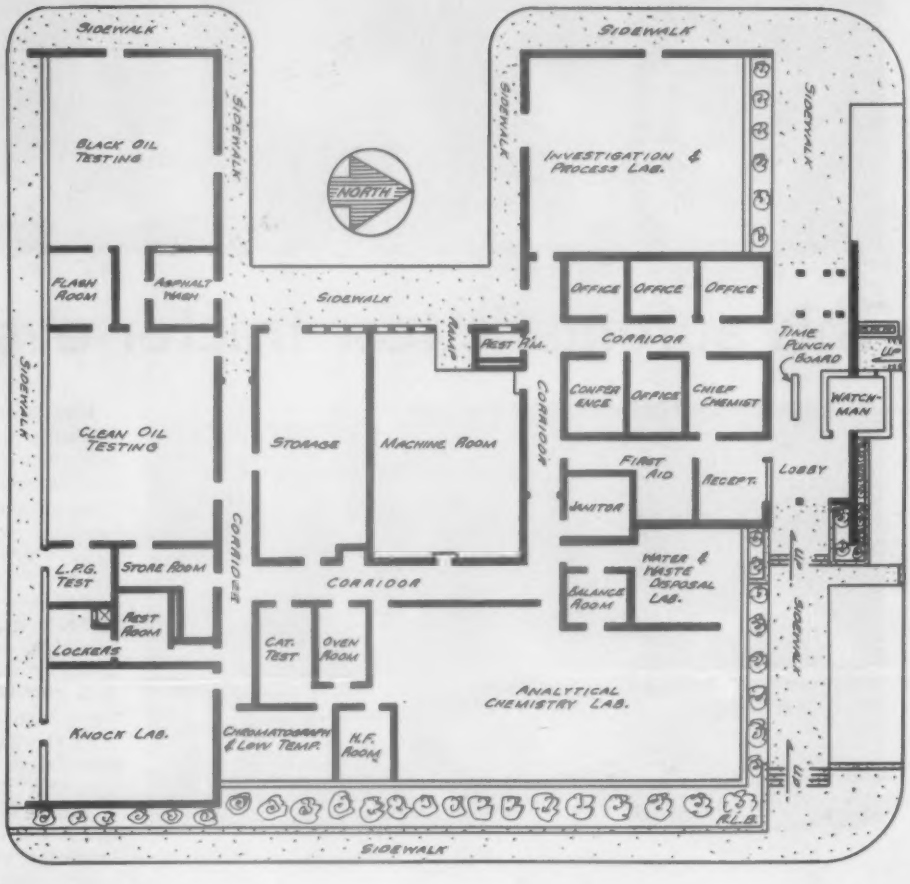
As the tractor stops, an automatic horn sounds to notify employes in the area that the machine has arrived. And there it stays until someone services it and sends it on its way again. Employes who need the tractor at points other than the beacons can easily stop the device at any point on the loop.

In making its normal automatic run, the train passes through two gates provided for the exclusive use of the machine. The gates open and close automatically on signals triggered by the tow tractor.

A safety bumper extending from the front of the tractor automatically stops the machine when the bumper touches any object in its line of motion.

The new unit, called the Barrett Guide-o-Matic electronic system, is manufactured by Barrett Electronics Inc., Northbrook, Ill.

BUILDING IS EQUIPPED with central, all-electric heating and air conditioning. Floor space is about 15,000 sq. ft. and includes an office area, time-clock space, and main-plant gate-watchman headquarters.



BY W. L. PURSELL
Skelly Oil Co.

Skelly replaces its outgrown facilities with...

A new look in control laboratories

A REFINERY control laboratory generally has no income; yet a refinery cannot compete without facilities for running laboratory tests to check its operations. This tends to class the control laboratory with the other "necessary evils" a refiner must put up with to stay in business.

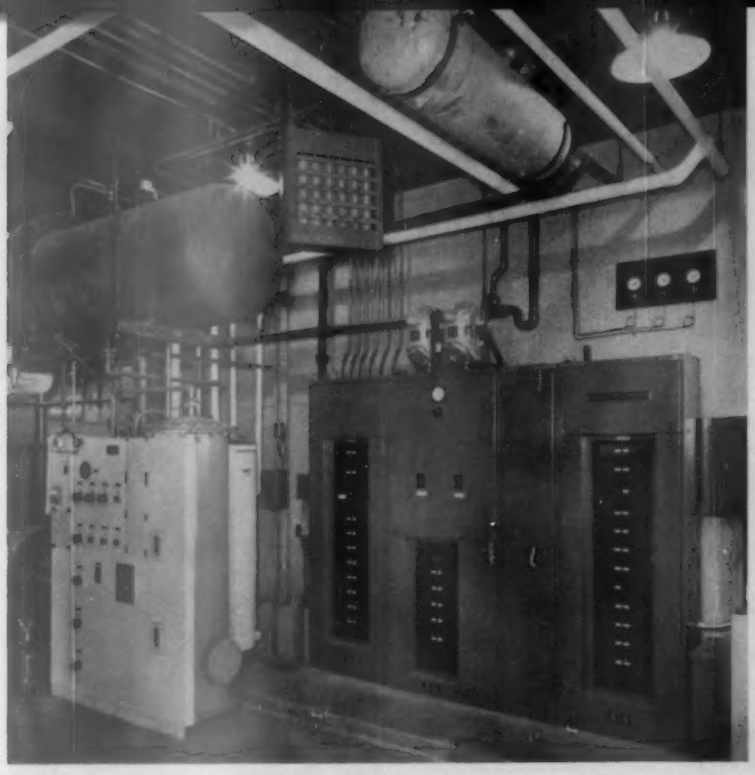
We at Skelly Oil Co., El Dorado, Kans., watched our plant more than double in size over a 15-year period and were still trying to keep up with its operation with the same laboratory space. Apparatus was stacked on top of apparatus and at times it seemed as if men were stacked on men in an effort to get the necessary testing done.

To take care of our rapidly expanding requirements, we soon found it necessary to build a new control laboratory. The new building provides more than twice the floor space that was formerly available for each testing procedure. New, efficient apparatus was added. And there is plenty of room for expansion.

Paper presented at Mid-Continent regional WPRA meeting, Wichita, Kans.

Building Layout

Construction is of structural-steel-reinforced concrete and masonry with brick veneer. The roof is built-up as-



DEIONIZER AND ELECTRIC switch rack are located in the machine room. This room also houses a vacuum pump, and air compressor, and an electric water heater which serves all laboratories.

phalt and gravel on a gypsum deck.

The building has a reinforced-concrete floor and rests on concrete piling and grade beams. This type of construction was used to resist settlement and oil seeps that may take place, since the building area was occupied by oil-processing units in years gone by.

Locating the building next to the main plant entrance permitted adding the time clock space and watchman's quarters.

The watchman controls pedestrian entry to the building and plant, as well as vehicle entry through the main plant gate attached to the north side of his quarters. He operates the electrically driven gates by remote controls and the pass-through window in the west wall permits direct contact and check with vehicle operators.

A reasonably central location is provided for the storage room, machine and utility room, the janitor room, and the rear service area. The first-aid room may be entered from both inside and outside the plant. Quarters are provided for a nurse and doctor.

Office space serves the laboratory supervisor, his secretary, and foremen over the various laboratory units. Offices are located to give maximum protection from fire or explosion that may happen in other parts of the building.

Laboratory rooms are grouped around the central machine and service area to promote safety and efficiency.

The outside area south of the laboratory is assigned to the shops and warehouse as a service area. Laboratory traffic in this area must be held to a minimum.

The two oil-testing rooms are located to provide a direct outside entry for each because most samples enter the laboratory through one or the other of these two rooms. It was necessary to locate the west door to the south hall inside the building to gain this outside entry for the clean-oil test room.

The asphalt wash room has an outside entry and a passage from the black-oil test room to promote safety and good housekeeping. This room is closed off from the rest of the building during normal operation.

The properly ventilated, draft-free, flash room is located to serve both oil-test rooms. LPG testing is assigned to a separate small room with its own outside door.

The knock room has a proper outside wall handling engine exhaust, and is far enough removed to avoid vibration in other parts of the building, yet is reasonably close to the clean-oil test room where samples originate. An 8-in.-thick reinforced-concrete floor, held completely separate from the building by expansion joints, helps suppress knock-room vibration.

The analytical-chemistry room handles fewer and smaller oil samples than the other rooms. A smaller amount of fuel for feeding a fire should be present at any one time. Since this room is safer than the others, it was located where no outside entry is available. The east wall of the building, which is also the east wall of the chemistry laboratory, serves as a refinery fence and there was to be no entry to the plant unattended by the watchman.

The analytical-chemistry room is subdivided into several smaller rooms. Catalyst testing was segregated to control noise and dust. Ovens were segregated to control heat. Hydrogen fluoride testing was segregated to control fumes. These segregations also eased the load on the heating and air-conditioning system.

Analytical balances, chromatographs, and low-temperature column are given separate rooms to hold down outside interference.

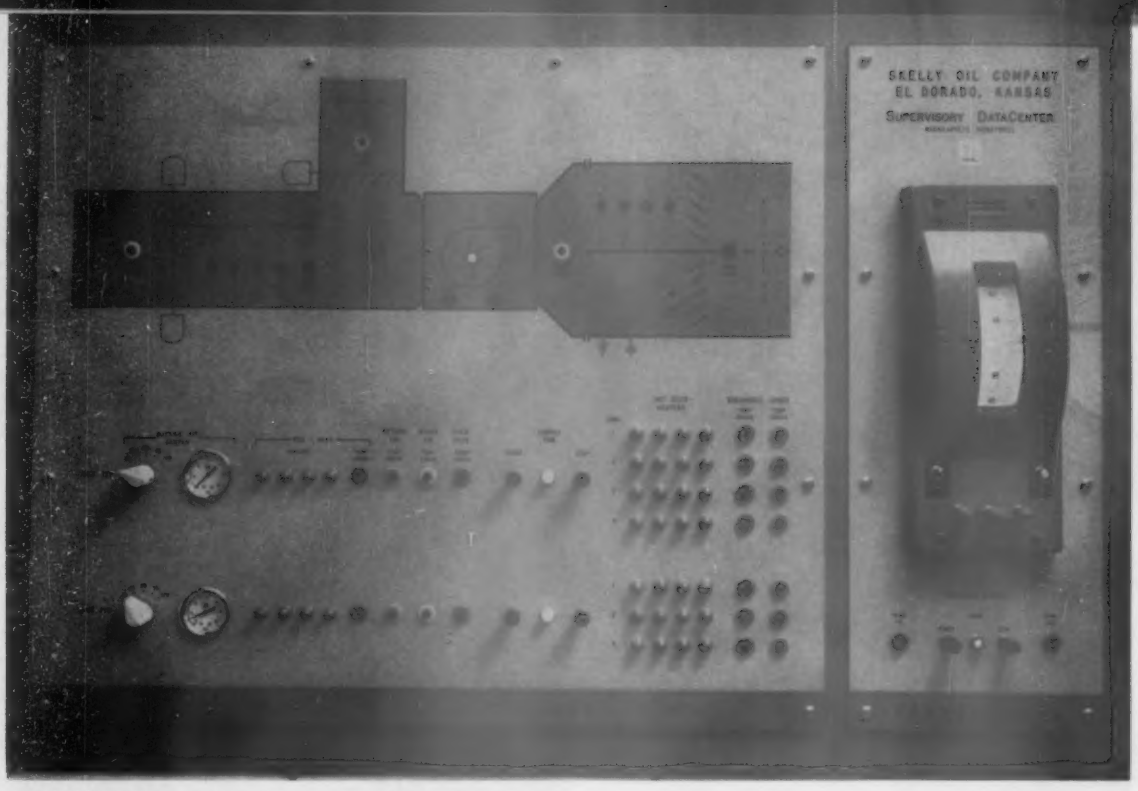
Water and waste disposal have a separately assigned room. This room connects to the related analytical-chemistry room and is located next to the office area, as the water laboratory is considered the safest of the group. This room is equipped for investigating and developing water-treating and waste-disposal processes as well as control testing.

It is difficult to predict activities in the process-investigation room. The room is essentially segregated from the rest of the building with extra outside entries. Activities least likely to produce a fire, such as glass blowing and metals examination, have been quartered near the inside wall.

Laboratory furniture is all-metal

The author

W. L. Pursell is chief engineer at Skelly's El Dorado, Kans., refinery, a position he has held since 1950. He joined Skelly in 1937, after taking BS and MS degrees in electrical engineering, and chemistry and mechanical engineering, respectively, from Oklahoma State University. Pursell holds a Kansas professional engineer's license and is a member of API, SAE, and NACE.



CONTROL PANEL monitors the two air-circulation systems.

with light-gray finish, asbestos-cement table tops, and Alberine sinks. Sinks are equipped with lead traps connected to high-silicon-alloy sewer pipe. A separate sewer system is provided for sanitary service.

Insofar as practical, laboratary furniture is located in the various rooms to provide orderly sample movement. Attempts were made to follow the circular - movement principle generally used by domestic kitchen designers. However, physical design of apparatus and rooms, and testing-personnel preference have interrupted circular movement in some cases.

The machine room contains, among other things, an air compressor, vacuum pump, electric water heater, and a deionizer to serve all laboratories. The deionized water is distributed in polyvinyl-chloride pipe. Air is distributed in black-iron pipe while other water is in copper pipe.

Ice baths and iced storage facilities are replaced by mechanical refrigeration wherever possible. Controls were changed on ordinary chest-type, household freezers to provide refrigerated sample storage. It was more difficult to obtain an ordinary 60°-77° water bath equipped with all-automatic controls.

The switch to mechanical refrigeration was effective. A 400-lb. per day ice machine can make more ice than the laboratory normally consumes.

Floors are covered with oil-resistant vinyl-asbestos tile. Epoxy-type adhesives are required to make total floor covering oil resistant.

Safety Features

The building is equipped with a separate fire alarm to warn all occupants of a fire. The two exit lights near the watchman are on the "hot" side of the alarm circuit to show electricity available to sound the alarm when needed.

Air in the halls is held at higher pressure than that in the laboratories to help prevent the spread of fumes and fire. Ventilating air ducts are equipped with dampers that close when overheated to prevent fire from spreading through the ducts.

Inside partition walls are extended to the roof deck as required to prevent fire from spreading through the attic space.

The building has no automatic fire-fighting systems, such as sprinklers. These may cause more damage than that caused by a fire when amount of fuel that may be present to feed the fire is considered.

Utility lines to various laboratory tables are in the concrete-walled tunnels in the floor. These tunnels are filled with fine, crushed stone and have gasketed metal covers. Ends of the tunnels are vented to outside through a flame arrestor and weather hood.

All laboratory rooms have at least two exits as far removed from each other as practical. Windows have to serve as the second exit for the HF test room and the rest rooms.

Electric System

All electric wiring in the building is in metal conduit. Explosionproof specifications are used only in areas and locations where the service justifies it. Attic space is classed as continually hazardous along with the asphalt wash room. Space near the floor is considered as most likely to accidentally become hazardous.

The asphalt wash room is wired 100% explosionproof for Class I, Group D areas. Wall switches are totally enclosed throughout the building. Electric arcing devices, such as switches, contactors, and controls that are mounted in the attic space, or in any other area where a gas pocket may easily accumulate, are in sealed, explosionproof housings.

Arcing devices located close to the floor are also in explosionproof cases. Water coolers are explosionproof. Contactors on the home freezers were placed in explosionproof housings when the controls were revamped.

The two incoming electric power circuits are four-wire, three-phase, 480 Y/277 volts with power supplied by a single three-phase transformer. These circuits enter the building underground. Conduits are sealed at the point where they enter the switchboard in the machine room.

All air-heating coils and 1-hp. and larger motors are on the 480-volt cir-

See why ALCOA ALUMINUM makes a good design habit

Requirement: strength without unnecessary weight plus superior corrosion resistance for world's first aluminum fly-in rig

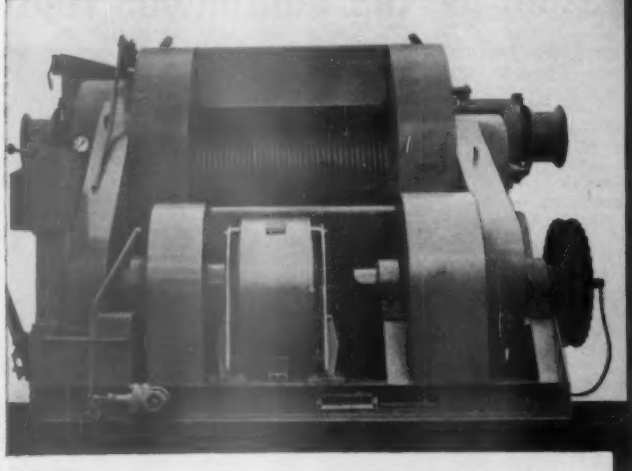
Key to good design: aluminum magnesium alloy 5456 developed by Alcoa

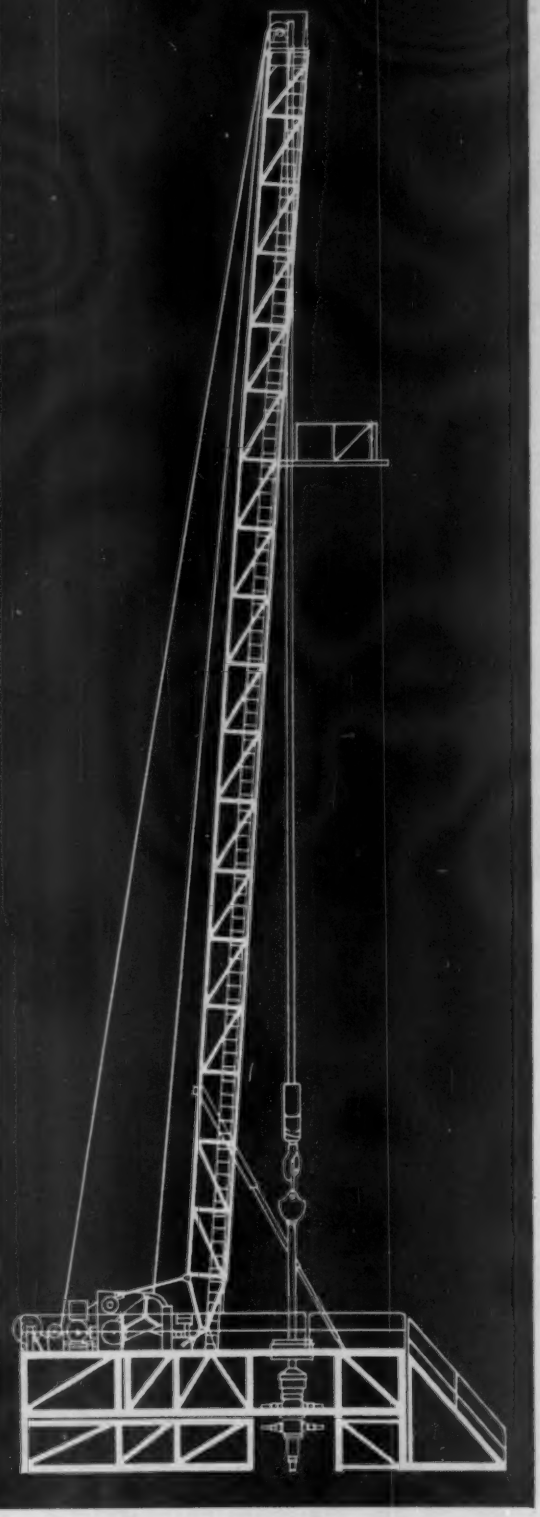
With tests in actual drilling muds, ALCOA engineers proved the superior corrosion resistance of aluminum magnesium alloy 5456 for use in the world's first aluminum fly-in drilling rig. And the excellent strength-weight ratio of this ALCOA®-developed alloy made it perfect for use in the subbase of a special Wagner Morehouse, Inc. draw works that forms the heart of the new rig.

The new rig makes extensive use of the light, strong, corrosion-resistant ALCOA-developed alloy throughout. The substructure is fabricated of aluminum structural members. A fabric mud tank employs an aluminum support frame. The suction tank and suction manifolding in the mud system are aluminum. And aluminum is used for a special shale shaker support and desanding ditch.

The new rig breaks down into 4,000-lb packages for easy helicopter transport. It will be used in hard-to-reach Central Bolivia—in a joint exploration program for Bolivia California Petroleum Co., a subsidiary of the Standard Oil Co. of California, and Compania Petrolera Boliviana Shell, Ltd., one of the Royal Dutch Shell group of companies. Loffland Brothers de Caracas C.A. is the drilling contractor.

Here you see how ALCOA engineers apply over 40 years of petroleum experience to make aluminum the good design habit for the petroleum industry. ALCOA knows aluminum and knows oil and knows how you can put the two together for more profitable operation. Our file of process industries literature will suggest many ways aluminum can serve you. To get it, write ALUMINUM COMPANY OF AMERICA, 865-H Alcoa Building, Pittsburgh 19, Pa. World-wide sales through ALCOA INTERNATIONAL, INC., 230 Park Avenue, New York 17, N.Y.





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DRIVE of time-proved LIGHTNIN Mixer design.

MIXING controls the retention time in baffled stages; holds solids in suspension as required.

BAFFLES set up controlled-regime flow pattern, making possible accurate scale-up and predictable results.

STAGE PROPORTIONS and separators are designed for each specific application.

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MIXING EQUIPMENT Co., Inc., 174-h Mt. Read Blvd., Rochester 3, N.Y.

In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Ave., Toronto 19, Ont.

cuits. The building lighting is on 277-volt circuit direct from the main transformer.

A three-phase dry-type transformer with 480-volt primary supplies 120-208-volt electricity for the operation of laboratory and office equipment. Dry-type booster transformers are used where needed to provide 230 volts for laboratory apparatus.

Adequate capacitors for power-factor correction are installed at the switchboard.

Heating and Air Conditioning

Central heating and cooling units are sized to take into account the heat liberated in the laboratory. If this is not done the size of these units will be enormous. Design loadings are: Heating, 480 kw., and cooling, 170 kw.

Pressurized fume hoods are used to reduce demands on the heating and cooling system. Outside air pulled in for hood operation is blast-heated electrically in the winter months to avoid low-temperature shock on work being done inside the hoods. Outlet ducts on the fume hoods are of aluminum and coated on the inside with urea-base paint.

No attempt is made to cool the machine room, storage rooms, oven room, and janitor's room. There is no return air duct from asphalt wash room, flash room, LPG test room, knock laboratory, HF test room, catalyst test room, machine room, office area, and rest rooms. Return-air ducts from the laboratories are omitted for safety reasons. Roof ventilators serve rooms with no-return air ducts as required. The machine room and main storage room have individual electric space heaters.

Two air-circulation units are used. The analytical-chemistry laboratory and the north wing are on one unit while the other unit carries the south wing.

A diagram of one unit is shown at the top of the control panel which is illustrated in an accompanying photograph.

The per cent of outside air used may be varied at will. This outside air is preheated to desired temperature before adding to the system. Dampers operate automatically to heat or cool the circulating air as desired.

Electric heating coils are designed for air movement past the coil to hold surface temperatures at a safe level. Thermocouples on the surface of the circulating air heaters cut off the electricity in case heater surfaces get above 400° F. This extra precaution was considered unnecessary on the makeup air heater.

Circulating air is cooled by passing chilled water through coils located in the air ducts. This water is chilled by a refrigerating system using Freon F-12 with air cooling. The coolers are on top of the building.

The data center is equipped with a potentiometer and push buttons to permit a check on all pertinent temperatures in the system. Makeup air is controlled at this point. Air fans and the chilled-water pump are started here. Lights come on to show the various items in operation.

Items are interconnected electrically so that neither heating nor cooling takes place until the fans are started. Cooling does not begin until the chilled-water pump is started. After that, the thermostats take over and control the various room temperatures.

The use of total electrical resistance heating with a separate cooling system appeared more practical for this installation than the newly developed heat pump. The most important economic factor was that of excessively low winter temperatures for efficient use of established refrigerants.

Fresh-air intakes are on the roof and above all parapets. All hood exhausts point away from the fresh-air intakes, and are located so that prevailing winds will not cause fumes to drift into the air intakes.

Acknowledgment

D. W. Blaine, Skelly's refinery safety engineer, gave valuable assistance in establishing safety requirements for the building. His efforts are acknowledged and appreciated.

BOOKS

GAS RATE FUNDAMENTALS. Published by American Gas Association Rate Committee, 420 Lexington Avenue, New York City, 357 pp.

This is a handbook and reference work for rate men in gas pipelines and distribution utilities, prepared by the Rate Committee of AGA. It deals primarily with laws and procedural requirements of Federal Power Commission and state utilities commissions. Principal sections cover making cost-of-service studies, pricing of service and rate forms, statistical analysis used in rate making, operation of a rate department, and proceedings before regulatory commissions. Typical rate schedules, billing forms, and cost analyses are presented. Introductory sections give brief history and description of the nature of the natural-gas industry in the United States, and trends in fuels competition. There is a brief summary of the leading court decisions governing utility regulation and the various regulatory theories involved. The volume does not discuss producer regulation other than to sketch difficulties of applying cost-of-service method to production.

PROGRESS IN DISTILLATION ENGINEERING (FORTSCHRITTE DER DESTILLIERTECHNIK). By H. Brauer, A. Hupe and H. Klingenspor. Published by Verlag Chemie GmbH., Weinheim/Bergstrasse, Frankfurt, Germany. 284 pages. $4.10 to Dechema members, $5.10 to nonmembers.

This book, Vol. 37 of the Dechema Monographs, describes three comprehensive experimental investigations on rectifying columns.

The first investigation was concerned with the properties of two-phase flow in rectification in packed columns, and was carried out at the Max-Planck Institute in Gottingen.

The second study on control problems in continuous distillation columns, was carried out in the Institut für Mechanik of the Technische Hochschule Hannover.

The third experimentation delved into the application of the similarity theory to the processes in rectification columns.

ECOLOGY AND DISTRIBUTION OF RECENT FORMINIFERA. By Fred B. Phleger. Published by Johns Hopkins Press, Homewood, Baltimore 18, Md. 297 pp. $7.50.

Of direct interest to geologists in the oil industry, this book is a summary and evaluation of research on foraminifera. These small calcareous protozoa live in sea water; at death their shells sink to the bottom of the sea. Since foraminifera have existed for millions of years, their shells tell us a great deal about sea floors, the temperature of ancient seas, the location of oil, and other natural phenomena.

The information obtained from studies of foraminifera has previously been available only in widely scattered scientific media. For the first time a recognized authority in the field has brought this information together, as a unified and manageable whole. All the major published data on modern foraminiferal ecology are included, together with a large volume of distribution data.

The author's compilation and interpretation of the material form an original and significant contribution to this fast growing field.

This unique work constitutes the only available handbook for geologists, ecologists, and oceanographers seeking to study foraminifera. Its clear and well-organized structure makes it an invaluable reference work.

A CENTURY OF OIL AND GAS IN BOOKS. Compiled by E. B. Swanson. Published by Appleton-Century-Crofts, Inc., 35 W. Thirty-second Street, New York City 1. 230 pp. $4.75.

Here, in one volume, is a listing of every important book on petroleum published in the last 100 years.

Of necessity, there are restrictions. In the first place, only material in books was listed. Fiction was not listed. Material which borders but does not deal exclusively with petroleum were avoided, such as the broad fields of chemistry or geology. Promotional material and books dealing with equipment for using petroleum products have been eliminated.

What is left is a hard-core listing of more than 2,000 items which, in addition to giving the title, author, publisher, city of publication, date of publication, and number of pages, give a brief description of each item to enable the user to know about its content and value.

This bibliography was prepared with the assistance of a grant from the API, and is designed to help guide those researchers and librarians seeking information on petroleum.

Note: The Oil and Gas Journal maintains a book department. Write to the READER SERVICE DEPARTMENT, P. O. Box 1260, Tulsa 1, for copies of the book list. Often books reviewed here may be purchased from this source.

Field Performance Report

Users confirm that DOUBLE GRAY-X® Wire Rope lasts longer on tough jobs

Field reports are now coming through on CF&I-Wickwire's superior new wire rope—Double Gray-X. These reports, a few of which are summarized here, all agree on one point — when the going really gets tough, Double Gray-X lasts longer than other wire ropes.

Double Gray-X is the result of CF&I's intensive research program leading to the discovery of a remarkable new wire-drawing technique. This process includes the use of Molysulfide* in the lubricant, which creates a *permanent molecular shield* around the individual wires, resulting in these benefits:

- **reduced friction between individual wires in every strand of Double Gray-X during service;**
- **smoother wire surface, which helps eliminate the "weak links" that can cause breakage and impair service life;**
- **greater resistance to abrasion, crushing, bending.**

And—in addition to longer life—Double Gray-X gives you extra strength. Made of extra-improved plow steel with an independent wire rope core, this rope gives 15% higher breaking strength than the catalog breaking strength of an improved plow steel rope with IWRC.

Double Gray-X is made in a wide range of sizes and constructions. It's available from CF&I-Wickwire's chain of warehouses and nation-wide network of distributors. For complete details, call the nearest CF&I sales office or a Wickwire Rope distributor.

REPORT: ON THE SACRAMENTO RIVER, two dredges – the *Papoose* and the *San Diego*—are sucking up tons of silt to help make Sacramento a seaport. Both use Double Gray-X for lines on swings, spuds and ladders.

Captain Nick Carlson of the *Papoose* (Hydraulic Dredge Company) says: "The Double Gray-X rope that holds the suction head really takes a beating on both spud and swing lines, but it's still in fine shape. However, another brand of wire rope put in at the same time is beginning to show wear."

Captain Ralph Vea of the *San Diego* (Pacific Dredging Company) reports: "When you're down with rope failure in this business, you're really out of production. But Wickwire Rope, which we have been using for nineteen months, really keeps us going. We used to change swing lines every six weeks, but the Double Gray-X we have on there now has been in service nine weeks already. That new protective shield on the rope really does the job."

*Registered Trademark of Climax Molybdenum Co.

REPORT:

IN THE MOUNTAINS OF COLORADO, the Hopkins Construction Company relied heavily on Double Gray-X on "two of the toughest construction jobs we ever handled." Both required the moving of more than 300,000 cubic yards of material. Many different types of earth-moving equipment, including the power shovel pictured above, were equipped with Double Gray-X — with these results:

President Hopkins: "Every minute of working time counted on the Cheyenne Mountain job because we faced a $5,000-a-day penalty if we didn't finish it in 45 days. The service we got from Double Gray-X was wonderful. We didn't lose 1% of downtime because of rope failure — and we completed the job in exactly 45 days."

Duane Rundle, Project Superintendent on the South St. Vrain Canyon job: "Rope life has been improved and downtime cut drastically since we switched to Double Gray-X. Maintenance is no problem at all. We just grease the rope when needed."

REPORT:

ON ROTARY OIL RIGS of the Falcon Seaboard Drilling Company, a prototype of Double Gray-X underwent tests that put wire rope to the most extreme abuse. Mr. Jack Starr, Vice President in Charge of Drilling, comments: "The results obtained with the original prototype of Double Gray-X led to our decision to order a carload of this improved product. Falcon Seaboard insists on the best products to serve the oil industry in accordance with today's modern standards."

WICKWIRE ROPE

THE COLORADO FUEL AND IRON CORPORATION

CF&I STEEL

In the West: **THE COLORADO FUEL AND IRON CORPORATION** — Albuquerque • Amarillo • Billings • Boise • Butte Denver • El Paso • Farmington (N. M.) • Ft. Worth • Houston • Kansas City • Lincoln • Los Angeles • Oakland Odessa (Tex.) • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco • San Leandro Seattle • Spokane • Tulsa • Wichita

In the East: **WICKWIRE SPENCER STEEL DIVISION** — Boston • Buffalo • Chattanooga • Chicago • Detroit Emlenton (Pa.) • New Orleans • New York • Philadelphia

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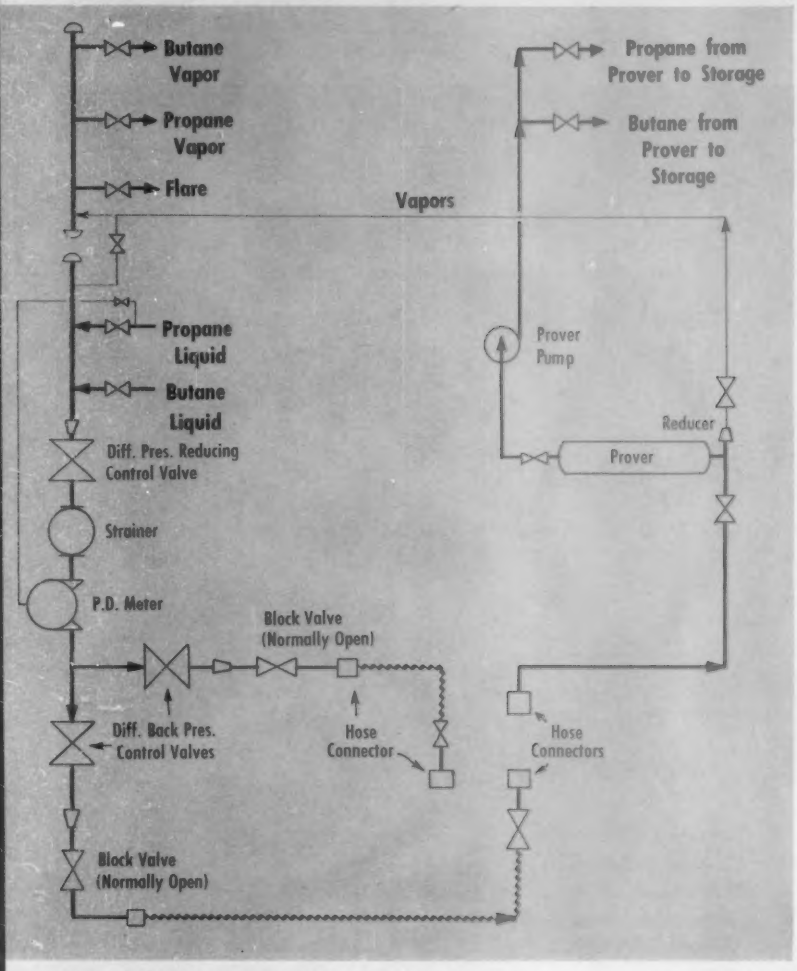


POSITIVE DISPLACEMENT METERS are less expensive to install and lend themselves more readily to unattended type of operation.

Now LPG truck-loading racks feature self-service

IT'S GETTING HARDER and harder to make a dollar in gasoline-plant operations these days, and to meet competition, all phases of an operation must be closely examined for possible improvements in efficiency and economy. So, why not consider unattended truck loading of products? Pure Oil Co. has designed and operated a trial "self-service" installation and is very happy with the results.

The attractive prospects for unattended loading are at locations where the volume of products or type of operation requires most of an attendant's time. Some small locations may have part-time loading duties reduced to a point that investment for further reduction would not pay out.

Assuming that existing storage vessels and loading lines are adequate, the major requirements for an unattended installation are:

- Preferably electric-drive centrifugal loading pumps for simple control of automatic start-stop operation.
- Simple "push-button" type of control for product selection and delivery.
- Measurement system that will be accurate and adaptable to push-button operations.
- Positive method of injecting odorant into product deliveries.
- Control system that will provide dependable, fail-safe operation.

Loading pumps. With unattended operation, there must be a means of starting and stopping the loading pumps remotely from the loading rack. Electrically driven pumps lend themselves well to push-button operation. One method for electric control would be the use of relays in conjunction with a magnetic motor starter. A relay starter switch could be connected in series with the electrical circuit of the meter keylock totalizer for each product pump. In this way, numerous product pumps may be selected, started, and stopped as desired from the loading rack. Each product pump start button can be plainly labeled for easy driver selection of product.

Measurement

Accurate, dependable product measurement which can be maintained and controlled by the operator must be provided. There are several methods of measuring LPG such as scales, positive-displacement meter, orifice meter, and turbine impulse meter. The latter two types of measurement would not provide the versatility, ease of operation, and positive control that could be obtained with the other types mentioned.

Meter selection. Pure Oil chose the positive-displacement (PD) meter for these reasons: (1) they felt that PD meters will give better accuracies than scales with the same amount of care in operation, (2) the PD meter is less expensive to install, and (3) the PD meter lends itself more readily to unattended operation.

The meter selected had such features as a keylock totalizer and set-stop counter. It was not equipped to compensate for temperature because a record of the gross volume was felt necessary. Because of the dryness of LPG products, PD meters for this type of service should be derated 20% from their normal water rate so as to eliminate the excessive wear at their maximum throughput. In addition, the internal working parts should be specially coated.

Based on experience of others, the meter strainer was converted to a filter by installing a specially built nylon felt sock inside the strainer basket. Meter life should be increased many times by this action.

Meter proving. To prove the PD meter, a vapor condensing prover was installed. The loading hose is connected to the prover and a run or two made to equalize the system temperature and pressure. The product entering through the top is sprayed into the vessel over a spray plate and condenses product vapors, allowing the prover to fill liquid full. Since a vapor-condensing prover is not a continuous flow type of prover, a small auxiliary pump is needed to pump the product back to storage.

Volume correction. The following

Adapted from "Unattended Truck Loading of LPG" given by A. R. Castoe, Pure Oil Co., at the annual NGAA convention in Houston, 1960.

are two approaches which could be used for correcting the gross volume through a PD meter: (1) use a gross-reading meter, record the product temperature or print it on the delivery ticket, and then apply a pressure-temperature correction factor to obtain the net gallons when billing the delivery; (2) use a meter on which a pressure-temperature-specific gravity compensating device has been installed, thus obtaining a direct printing of the net volume delivered. Proven temperature-specific gravity compensators for meters are on the market, but as yet the pressure correction has not been added to the device.

Odorization. In providing automatic odorization of the product delivered, a means for positive injection and control of the odorant into each delivery is a must. Small positive-displacement pumps driven by impulses from the product PD meters should serve satisfactorily for automatic odorization. For a record, an impulse recorder-printer in the product meter printer would make a possible means of printing the amount of odorant added on the delivery ticket. If any nonodorized deliveries of product were required, a lockout device which records or prints "product unstenched" would be needed. The lockout device could be operated only by plant personnel.

Control valves. In choosing the control valves, the difficulty of obtaining instrument air at the loading rack was considered. On the basis of this and their low cost, piston-type valves were selected. These valves use the flowing fluid as the controlling medium. Also, while being designed for throttling action, they provide a positive leakproof shutoff. Another feature well suited to this application is that they may be controlled by self-contained pilots or external pilots.

Valves fitted for external pilots were installed on the main loading and vent lines downstream from the meter for the purpose of maintaining a constant back pressure on the meter above the liquid equilibrium pressure to insure accurate measurement of liquid.

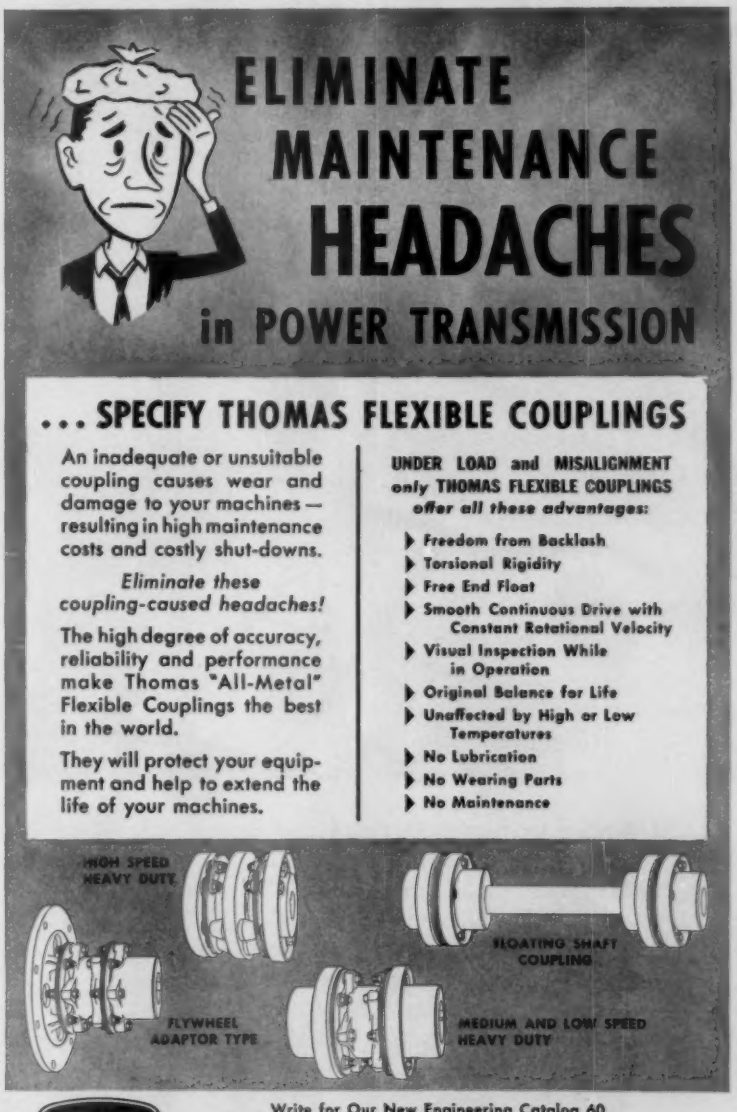
A solenoid valve is used as a pilot for both loading valves. This pilot valve provides open-close control of the two loading valves, or through the meter set-stop counter and keylock totalizer switches, the starting and stopping of the loading operation. Through a differential pressure switch this solenoid pilot valve also shuts off the total product flow in the event of hose or connection breakage.

A third pilot is used on the main loading valve to shut off or throttle in the event the pressure on the truck tank approaches its relief-valve set pressure. The vent loading valve remains open and continues to spray the product into the tank, thus reducing the pressure so that normal loading will continue. Spray loading of LPG products without venting has become common practice in loading tank cars, and lends itself for use with PD metering of LPG to trucks.

In the event the third pilot, through its control, shuts off or throttles the main flow of product, the pumping head would build up thus changing the constant differential back pressure on the meter. To avoid this, a differential pressure-reducing valve, the same type as loading valves, was installed immediately upstream of the meter and strainer.

Fail-safe. With all of the loading system controls interconnected by the electrical system, a simple fail-safe operation can be obtained. The simple, step-by-step loading procedure will minimize the functions and responsibilities of the truck drivers.

Although the duties of the truck drivers have been increased, the customer will obtain many advantages, such as less total time in loading; 24-hour, 7-day service; and a more reliable, accurate measurement of products purchased.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Drill Barge in Buras Levee Uses Bethlehem Wire Rope. When photographed, this barge rig was drilling in the Buras Levee District 7 Field, near Empire, La. The operator, Sharp Gulf Drilling Co., drilling for Pan American Petroleum Corp., reported good service from a 1½-in. Bethlehem rotary line... 6 x 19 Formset Purple Strand, right lay, with IWRC. Bethlehem Wire Rope provides good service because it is engineered for the job. That's why it pays for itself many times over in ton-miles logged—a matter of logic known to thousands of successful operators in the oil country.

Bethlehem Steel Company, Bethlehem, Pa. *Export Distributor:* Bethlehem Steel Export Corporation

Wire rope mill depots and distributors from coast to coast stock Bethlehem Rope

BETHLEHEM STEEL

BY W. L. NELSON
Technical Editor and
Petroleum Consultant

Equilibrium data for absorption of H_2S in amine solution

Can you suggest equilibrium data on the absorption of hydrogen sulfide in ethanolamine solutions? We are unable to locate good data. S.W.T.

Data are few and getting them is complicated by the fact that carbon dioxide and hydrogen sulfide each tend to displace the other from solution (to some extent). The fact that water is present is an added complication because ionization occurs to some extent.

Perhaps the most complete equilibrium data among the references listed below are those of Atwood, Arnold, and Kindrick.[2] This article pertains to mono, di, and triethanolamines, it covers the complete range of operating conditions, but it does not introduce the effect of carbon dioxide on the solubility of hydrogen sulfide. Among the best design papers is that of Reed and Wood, but it scarcely discusses the equilibrium relationships.

Only carbon dioxide is studied in some of the articles listed here. Monoethanolamine has been studied most completely (References 1, 2, 4, 6, 7, 8, 10, 11, 12, and 13), diethanolamine has also been studied extensively (References 1, 2, 3, 7, 8, 11, 13, and 14), triethanolamine in several references (1, 2, 3, 5, 7, 8, 13, 14, and 15), and a combination of mono and diethanolamine in three articles (4, 5, and 9). The absorption of carbon dioxide is the main subject of References 1, 7, 8, 11, 13, and 14.

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Pipeline contamination by TEL, other additives

When other products as well as gasoline are pumped through pipelines, is the contamination with tetraethyl lead harmful? Also, what about contaminations which will be reflected in less known tests such as the burning test of kerosine? S. T. V.

Although several deaths occurred many years ago in the handling of concentrated tetraethyl lead, no trouble has been reported with leaded gasolines even though as much as 4.6 and even 6.0 ml. per gal. has been used. As far as is known, the slight contamination of white or wash gasoline, solvents, etc., that occurs in multiproduct pipelines does not constitute a hazard to health. With respect to reformer feed stocks (seldom sent through product lines), a contamination by lead of even 50 parts per billion or less is thought to be harmful because of deterioration of the platinum catalyst used in reforming. No one has mentioned the possible harmful effect of TEL on jet fuels. A limit of 6.5 p.p.m. might be a reasonable figure.

There is, of course, a possibility of contamination that will be reflected in many less-known test specifications, especially for closely specified materials such as solvents or kerosines. In the case of solvents, various evaporation tests are used which indicate the presence of minute amounts of greasy or high-boiling material. Possibly such tests would become critical if contamination with high-boiling materials were possible. Likewise the wick char test which is a part of the burning-test specification of the Institute of Petroleum might be troublesome. This test measures the amount of char or cokelike material deposited on the wick during the burning test. High-boiling contaminants might lead to char formation.

Pressure, instead of draft in tube-still heater

We seem to have a pressure of 0.1 in. in the top of our upright-type tube still. We have been considering increasing the height of our stack. Can you discuss this please? F.C.R.

Although the stack of your still may not be tall enough, your difficulty is probably caused by other factors rather than an inadequate stack. About the only way a pressure could be encountered in the top of the furnace would be an abnormally large friction loss in the convection section, which lies between the furnace and the stack. The spaces between the tubes are either too small or the amount of excess air (or flue gases) being sent to the stack is too large.

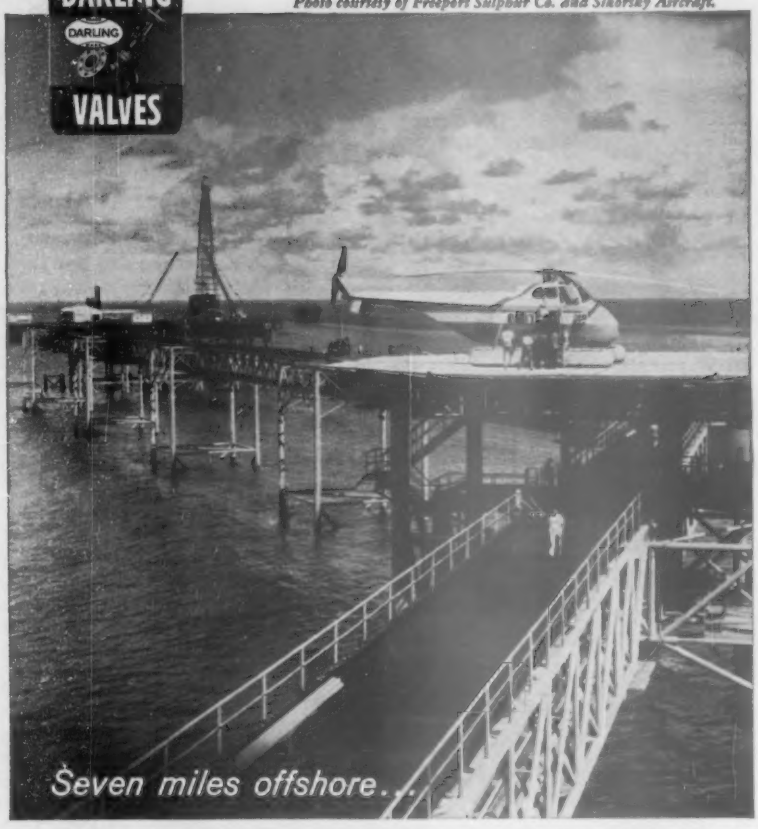
The very hot gases in the furnace cavity exert a strong tendency to rise. The tendency usually exceeds 0.01 in. of water per foot of height. Thus if the height is 30 ft., a draft of about 0.30 in. would be produced—or stated another way, the gases would try to leave the cavity by exerting a pressure of 0.3 in. at the top of the still. If the friction loss in the convection section were less than 0.30 in., no pressure would be produced at the top of the cavity even though there was no stack—and with a stack, a draft would exist at all points in the still. If the friction loss were very large, say 0.6-0.8 in. water, then a pressure could exist at the top of the still.

If a pressure of 0.1 in. is being encountered, it is probably the result of using too much excess air. Have a look at the percentage of carbon dioxide and oxygen in the flue gases.

A pressure is dangerous. It will blow hot gases into someone's face or eyes.

DARLING
VALVES

Photo courtesy of Freeport Sulphur Co. and Sikorsky Aircraft.



90 DARLING VALVES

to help tap new sulphur deposit

Above you see part of Freeport Sulphur's $30,000,000 project to tap a major new sulphur deposit. It's the world's first offshore sulphur mining plant at Grand Isle... seven miles off the coast of Louisiana in the Gulf of Mexico.

Valves on the mile-long "steel island" mining plant were supplied by Darling. They include 2" to 12" OS and Y and 6" to 10" check valves made from Ni-Resist with monel trim ... all for use in corrosive service.

Here's another case where Darling's extensive research and development on corrosion-resistant valves helped solve a specialized operating problem. And on gate valves, Darling's *exclusive revolving double disc parallel seat feature* assures positive sealing and ease of operation at all times.

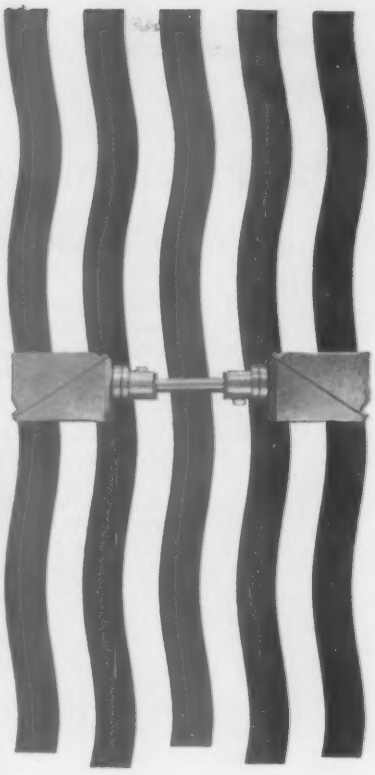
Let us assist *you* on applications where "just ordinary valves" won't do. Write or phone us about your valve requirements.

Darling OS and Y gate valve with flange ends . . . one of types being supplied for Freeport Sulphur's Grand Isle sulphur mining plant.

DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pennsylvania

Manufactured in Canada by Sandilands Valve Manufacturing Co., Limited, Galt 19, Ontario



for measuring color in continuous streams

Beckman Model 77 Continuous Turbidimeter-Colorimeter takes the guesswork out of clarity and color determinations... gives rapid, accurate readings to better than ±2% of light transmission. The Model 77 consists of an Analyzer Unit and Control Unit... precision designed and ruggedly constructed to bring colorimetry to continuous process applications. Among the wide range of applications are control of water and industrial waste treatment processes, and colorimetric quality control analyses in the production of chemicals and petroleum. ⌘ Outstanding Beckman features are: ±1% repeatability... push-button scale expansion from 0-100% to 0-50% transmittance... wavelength ranges from 350 to 1000 mμ. ⌘ Complete information applicable to your specific process is available from your nearest Beckman Sales Office. Or write direct for Data File 24-35-13.

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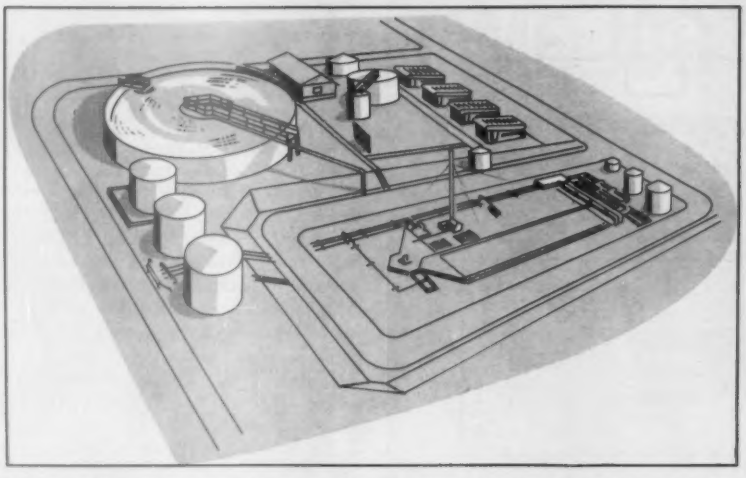


EFFLUENT-TREATER operation was improved by minor alterations, with the result . . .

Upkeep cost reduced on automatic pH control

BY RALPH G. SPROSTON, JR.
Shell Chemical Co.
Houston

THE NEW waste-water treating plant at Shell Chemical Co.'s plant in Houston features refinements that improve the reliability of automatic pH control systems and reduce the high maintenance costs that are usually associated with them.

It was found that:

1. Maintenance of pH systems can be minimized through the use of a pH signal simulator to quickly determine the origin of trouble, as well as provide a check of the metering system during normal operation.

2. All pH systems should be analyzed to determine the necessity of the thermo-compensator in the pH electrode assembly. In many cases this electrode can be eliminated with no adverse effects.

3. Electrodes can be placed directly in a mixing chamber to improve automatic control in a rugged service, such as an effluent-treater facility, with no unusual maintenance problems.

Presented at the 1960 Southwest District meeting of the AIEE in Houston.

The effluent is discharged from the secondary neutralizer into the roughing clarifier for removal of floatable oils and suspended solids, and for smoothing out small fluctuations in pH. Then it goes to the flash mixing tank for the rapid dispersion of a chemical flocculating agent. The waste stream containing the chemical agent next flows to the flocculation tank where large floc particles are formed, and on to the air flotation units where the flocculated sludge is removed and the clarified effluent discharged into the outfall channel.

pH signal simulator. As an aid in isolating the source of pH-system trouble to either the amplifier or electrode section, a pH signal simulator was designed and constructed at a cost of $200, the major portion of this cost being the pH adjustment potentiometer.

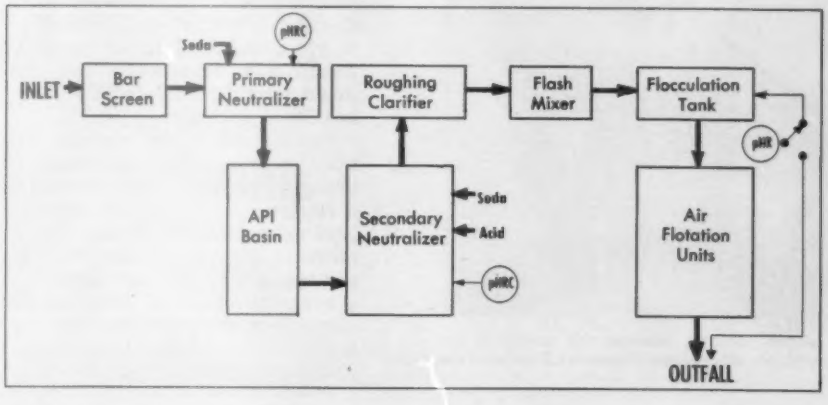
This instrument is basically a millivolt generator with a high internal resistance, using a voltage divider network to give positive and negative output voltages. The signal output can be set at any value from ±295 mv., which covers the potential generated by a glass-reference electrode pair from a pH of 2 to 12 at 77° F.

Process description. The wastewater plant was designed to provide an effluent of controlled pH, free of oil and suspended solids, which was suitable for reuse in some process operations.

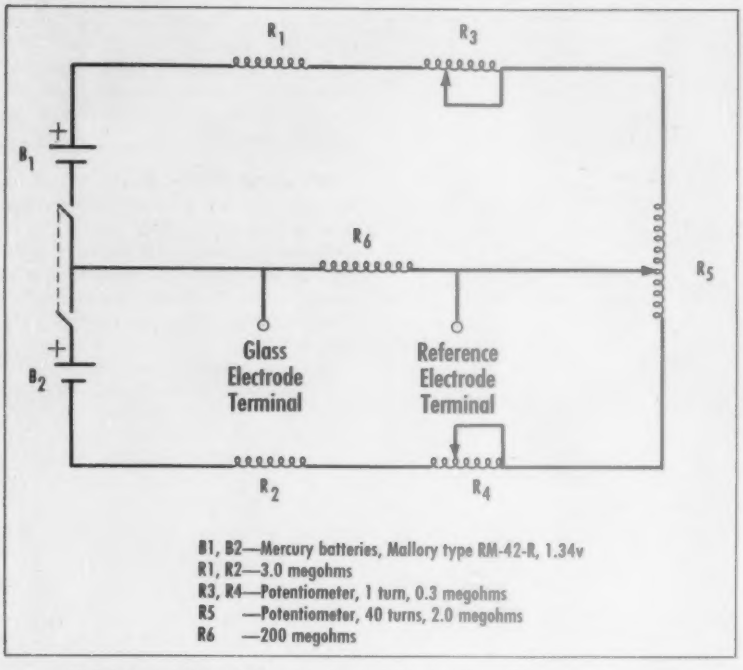
The discharge from two large chemical sewers passes through a pair of stationary bar screens which catch large pieces of trash. The discharge then enters the primary neutralizer where it is mixed with spent soda automatically introduced by a pH recorder-controller.

Flow from the primary neutralizer enters the API separator basin where the light materials rise to the surface and are skimmed off. Heavy materials sink to the sump in the bottom, and are pumped to a sludge pit. The partly clarified stream then flows to the secondary neutralizer where the pH recorder-controller operates a series of acid and caustic motor valves to maintain a pH of 8.0 (±0.5) to obtain a satisfactory floc in the flocculation tank.

In use, the calibrator is connected



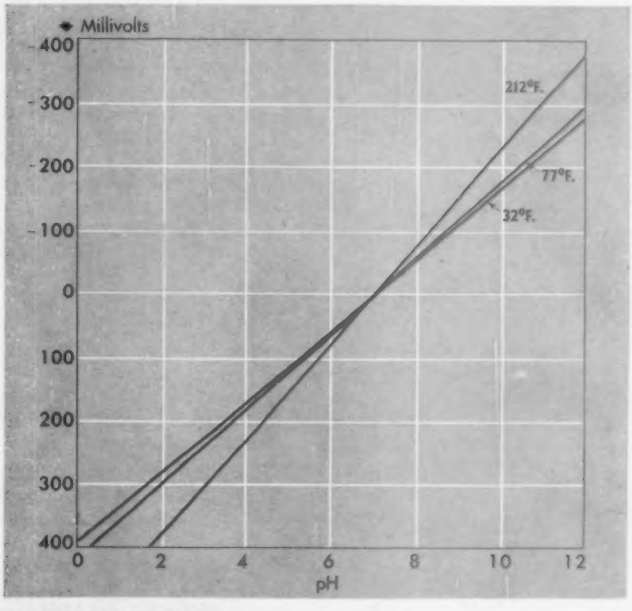
EFFLUENT TREATER was designed to provide water that was suitable for reuse in some process operations.



pH SIGNAL SIMULATOR aids in troubleshooting the control system.

to the amplifier in place of the glass and reference electrodes. If the amplifier is in proper working condition, it will read any pH between 2 and 12 that is set on the simulator. In this manner, the amplifier output can be traversed its full span and any inaccuracies, sluggishness, or erratic operation can be noted. If the amplifier functions properly, the source of trouble lies in the electrode system.

Thermo-compensators. The determination of the pH of a solution involves the measurement of the hydrogen-ion concentration by means of the potential generated by a pair of pH-sensitive electrodes. The common pair of electrodes used for industrial pH measurements are the glass-calomel pair.



TEMPERATURE VARIATION of the solution changes the potential developed at the glass electrode at pH values above and below the neutral point.

The temperature effect on the potential developed at the glass electrode is shown by the plot.

The common means of correcting for this temperature effect is by the use of a third electrode, which is temperature sensitive, in the pH electrode assembly. This electrode is normally a resistance thermometer which in the Beckman Model W pH meter is in the amplifier feedback circuit in series with the pH meter and the recorder resistor. As temperature of the solution varies, resistance of this electrode varies linearly at the rate of 5.4 ohms per °F., regulating current flow in the feedback circuit which corrects for error caused by temperature fluctuations.

The thermal-compensating electrode was initially used at Shell's effluent treater in the pH-electrode assemblies. These electrodes added considerable cost to the system, as well as presenting an additional maintenance problem. It was later noted that the temperature of the effluent varied only 15° F. throughout the year. This small variation was not enough to warrant the expense of thermo-compensators in the system, so they were removed and precision resistors substituted on the amplifiers. These resistances correspond to the average effluent temperature.

Electrode location. Automatic control of pH is one of the most difficult control problems. Care must be given to the location of the electrodes. The most satisfactory results have been obtained where it has been possible to immerse them directly into the mixing chamber. This eliminates time lags often found in continuous sample methods.

At first, all of the electrode assemblies installed in the effluent treater were of the immersion type. Coating of the electrodes with oily materials which concentrate near the surface was a major problem. Coating was lessened by submerging the electrodes to a depth of 3 or 4 ft. This meant abandonment of immersion-reference electrodes which become pressured due to hydrostatic head at this depth. To avoid this, sidearm-reference electrodes were installed in lieu of the immersion electrodes.

The sidearm on the reference electrode permitted the attachment of tubing that extended to the bottom of a reservoir bottle located above the level of the effluent stream. This arrangment permitted filling the bottle and tubing with HCl solution so that a hydrostatic head of filling solution was always exerted against the junction of the electrode. This eliminated possibility of effluent backup.

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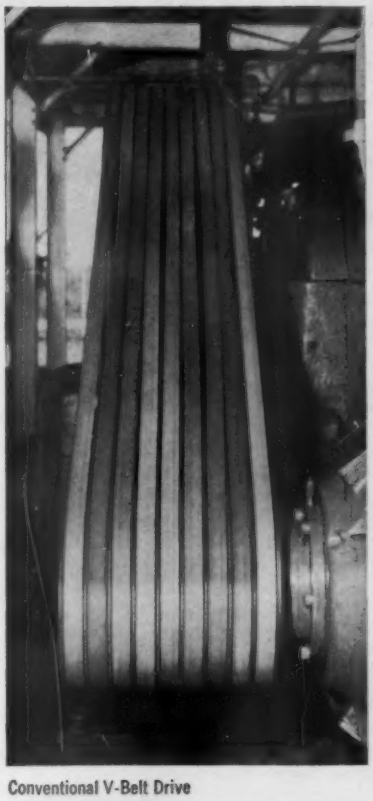
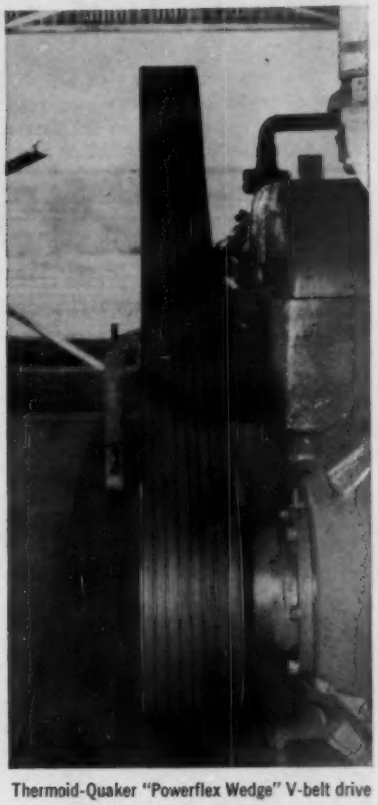


Conventional V-Belt Drive



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OIL-WELL PUMPING

PART II

Properties of sucker rods

BY JOSEPH ZABA

OF ALL the components of the oil-well pumping mechanism, sucker rods have the greatest effect on the action and performance of the whole system. Their behavior in the transfer of forces and loads determines the action of the pump. Their inherent characteristics affect the loads imposed on the surface equipment.

Permissible stresses, range of stresses, and speed of operation which a given sucker-rod string can handle, without too-frequent breakage, limit the economic depth of pumping and the economic capacity of the installation. Because of the important role the rods play in the system they are considered first in the discussion of the different components.

Studies of behavior of sucker rods and improvement in their metallurgical properties have helped increase the economic life of rod strings. They have also aided in design of sucker-rod strings for new installations, and offered remedies for excessive rod troubles on installations already in operation. These remedies may be in the form of changes in size of sucker-rod pumps, changes in material or size of sucker rods, or changes in the characteristics of the pumping cycle.

Specifications. The API's Standard 11B "API Specification for Sucker Rods" covers dimensional requirements primarily. As far as chemical requirements are concerned the specifications provide for two grades of rods, Grade C carbon-manganese AISI 1036 steel rods and Grade K nickel-molybdenum AISI 46XX steel rods. At the discretion of the manufacturer the chemical composition may be changed within reasonable limits to provide improved physical properties. The chemical requirements for other grades are subject to agreement between user and manufacturer.

On the basis of chemical specifications, commercially available rods divide themselves also into two large groups, the carbon-manganese and the alloy-steel rods. Depending on make, the carbon-manganese rods may contain up to 1.5% manganese. One purpose of this additive is to increase the strength of steel and make it less brittle.

In the alloy steel group of rods different metallic elements are added to (1) increase hardness, strength and, to some degree, the resistance to corrosion, (2) promote fine grain structures, and (3) improve response to metallurgical treatments. Different metallic elements, such as nickel, vanadium, chromium, copper, molybdenum, and boron are used to obtain one or more of these results.

Metallurgical treatments to improve the properties of rods include normalizing, normalizing and tempering, or liquid-quenching and tempering. Differences in types and amount of alloy additives used by different manufacturers and differences in their methods of treatment of steel result in availability of sucker rods within a wide range of mechanical properties. In the carbon-manganese group for example rods are available with yields from 60,000 to 80,000 psi. and ultimate stresses from 90,000 to 105,000 psi. In the alloy-steel group the ranges of yield and ultimate stress are respectively 60,000 to 120,000 and 90,000 to 135,000 psi.

For a number of years attempts have been made to arrive at a general classification of rods by the allowable working stresses. These attempts have not been successful and there is a question whether or not an agreement can ever be reached in this matter. Manufacturers are reluctant to subscribe to such a general classification. There are differences of opinion among users regarding the allowable stresses.

One of the important reasons for this lack of agreement is the difference of opinion regarding the effect of corrosiveness of the media in which the sucker rods work. Because of this, many users arranged their own groupings of the available rods by the allowable stresses while others depend on the manufacturers' recommendations. This lack of agreement makes difficult, if not impossible, an over-all standardized design of the rod pumping system in which the characteristics of the surface pumping unit would be most economically tied in to the rod string selected for the given well conditions.

API Standard 11B, effective January 196, contains tentative dimensional requirements for ½-in. sucker rods in addition to the standard specifications for the conventional ⅝, ¾, ⅞, 1, and 1⅛-in. rods. The need for these tentative specifications was prompted by use of the ½-in. rods in some slim-hole completions. API "tentative" specifications are published as a guide to users and manufacturers. They are usually incomplete and subject to change.

Stresses. Most sucker-rod difficulties are a result of overstressing. And the mechanism of sucker-rod failure is that of fatigue and corrosion fatigue. Let's consider briefly certain fundamentals which have a bearing on the problem.

In a bar subjected to axial loading, the unit stress is expressed by:

$$S = P/A \qquad (1)$$

where

S = unit stress or load per unit area, psi.
P = load, lb.
A = cross-sectional area, sq. in.

The unit stress is an average value and does not represent the maximum intensity of stress in the bar. Depending on axial forces involved, the stress may be tensional or compressional. With given load a decrease in cross-sectional area of the bar results in concentration of stresses.

Most materials used in engineering work are elastic. Upon application of a force the bar stretches, and returns to its original shape after the load has been removed. The science of strength of materials is based on law of proportionality of stress to deformation, Hooke's law. The ratio of unit stress to unit deformation of a material is called its modulus of elasticity and is designated by E. Modulus of elasticity is also defined as the imaginary force, in pounds per square inch, which causes deformation equal to the original length of the bar. Modulus of elasticity of steel is usually assumed to be 29,000,000 to 30,000,000 psi.

Hooke's law may be written

$$e = PL/AE \qquad (2)$$

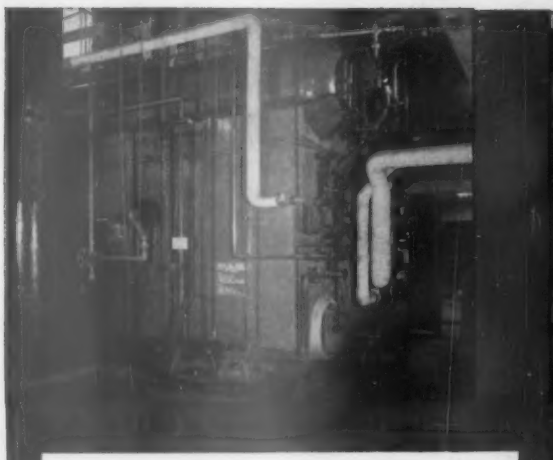
where

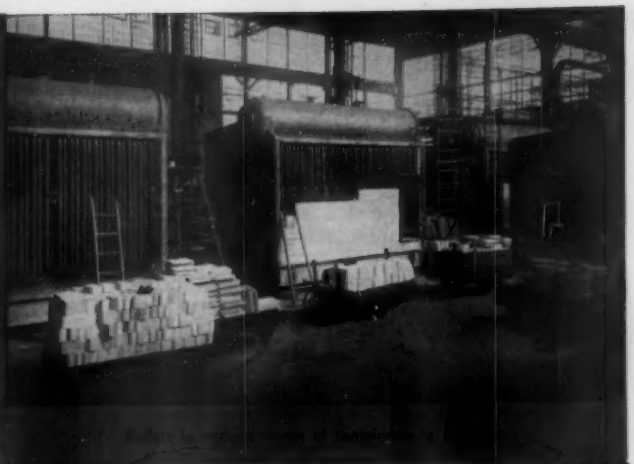
e = elongation
P = load
L = length of bar
A = area of bar
E = modulus of elasticity.

From Equation 1, $P = SA$, therefore, Equation 2 may be written

$$e = SL/E \qquad (3)$$

Hooke's law of proportionality of deformation to stresses applies only within certain limits. All materials have the so-called elastic limit, defined as the maximum stress which a given material can withstand without incurring permanent deformation. If the elastic limit of material is exceeded a unit stress is soon reached at which deforamtion continues with a small increase or with no increase in load. This unit stress is called the yield point.





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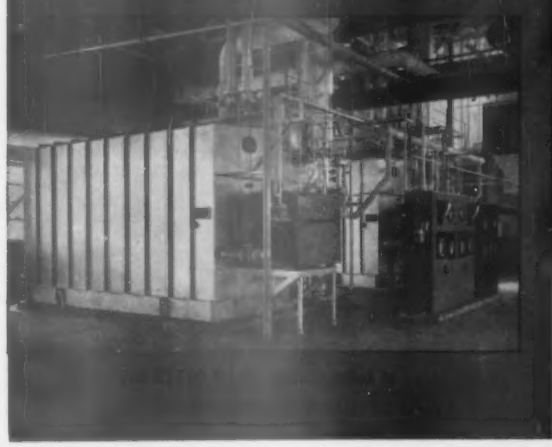

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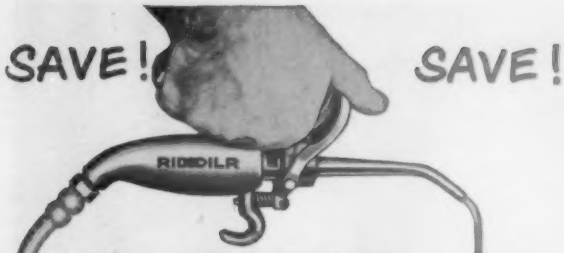

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The prefab comes in widths of 12-ft. multiples, enabling buildings up to 72 ft. wide. Lengths start at 32 ft., coming in multiples of 16 ft. to give any desired length. There are three basic heights: 10, 12, and 14 ft. Source: **Martin Steel Corp., Longview Ave., Mansfield, Ohio.**

15-in. circular slide rule

. . . now available makes a handy way to perform multiplication and division and to obtain reciprocals and proportions, square and square roots, cube and cube roots, circumference and area. It also contains conversion tables for metric, horsepower, kilowatt, liters, B.t.u., joules, and area computing. For easy reading, the rule is printed in red, black, and white. Its diameter is 6½ in. Source: **Bolind, Inc., Boulder 15, Colo.**

●

Air-comparison

. . . pycnometer on the market, the Model 200, uses only two cylinders and is both smaller and lighter than the older model. According to the maker, the instrument will not only shorten accurate density determinations from hours to 1 minute, but should open up new areas of application for density measurements for quality control, moisture and porosity determination, and others. Potential uses include core analysis for per cent porosity and density, density measurement of powdered and granular polymers, determination of the condition of porous catalysts, and per cent mixture for components of differing densities. Source: **Houston Instrument Corp., Box 22234, Houston 27.**

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Holiday detector

. . . for pipelines provides a constant voltage in any climate, the maker claims. Fully portable, the Model HP detector requires no generator. It makes use of a new electrical-field device consisting of a double electrode or plastic-coated saddle. This flexible pad is attached directly to the instrument carrier and creates a constant inspection voltage on the pipeline which is adjustable from 5 to 20,000 kv., according to the maker. Source: **Tinker and Rasor, 417 Agostino Rd., San Gabriel, Calif.**

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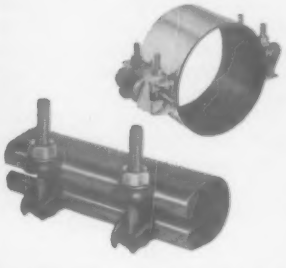

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actuator to be used with an electronic control system to eliminate freezeups caused by cold weather or low-temperature fluids. The Type P2R power relay contains a 30-watt heater in the pneumatic section that prevents moisture in the air from freezing the mechanism. Normally adjusted for direct action, the instrument can be changed easily to reverse action. Source: **Swartwout Div. of Crane Co., Hooksett, N. H.**

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Colorimetric analyzer

. . . called the Chemalyzer incorporates photoelectric comparison in colorimetric analysis, permitting automatic, on-stream monitoring of hardness, residual chlorine, or phosphates. Ranges of accuracy are: hardness, 0 to 3 p.p.m., residual chlorine, 0 to 1 p.p.m., and residual phosphates, 0 to 30 p.p.m.

According to the maker, the instrument will precisely monitor zeolite or base exchange softeners, residual chlorine in cooling towers, and excess phosphates residual in boiler water. Source: **Milton Roy Co., 1300 E. Mermaid Lane, Philadelphia 18.**

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. . . eases strength tests of a variety of materials such as metal and plastics. The Model M tester is designed so simple changes in grips quickly adapt the basic instrument for tests of tensile, compression, transverse, and shear forces.

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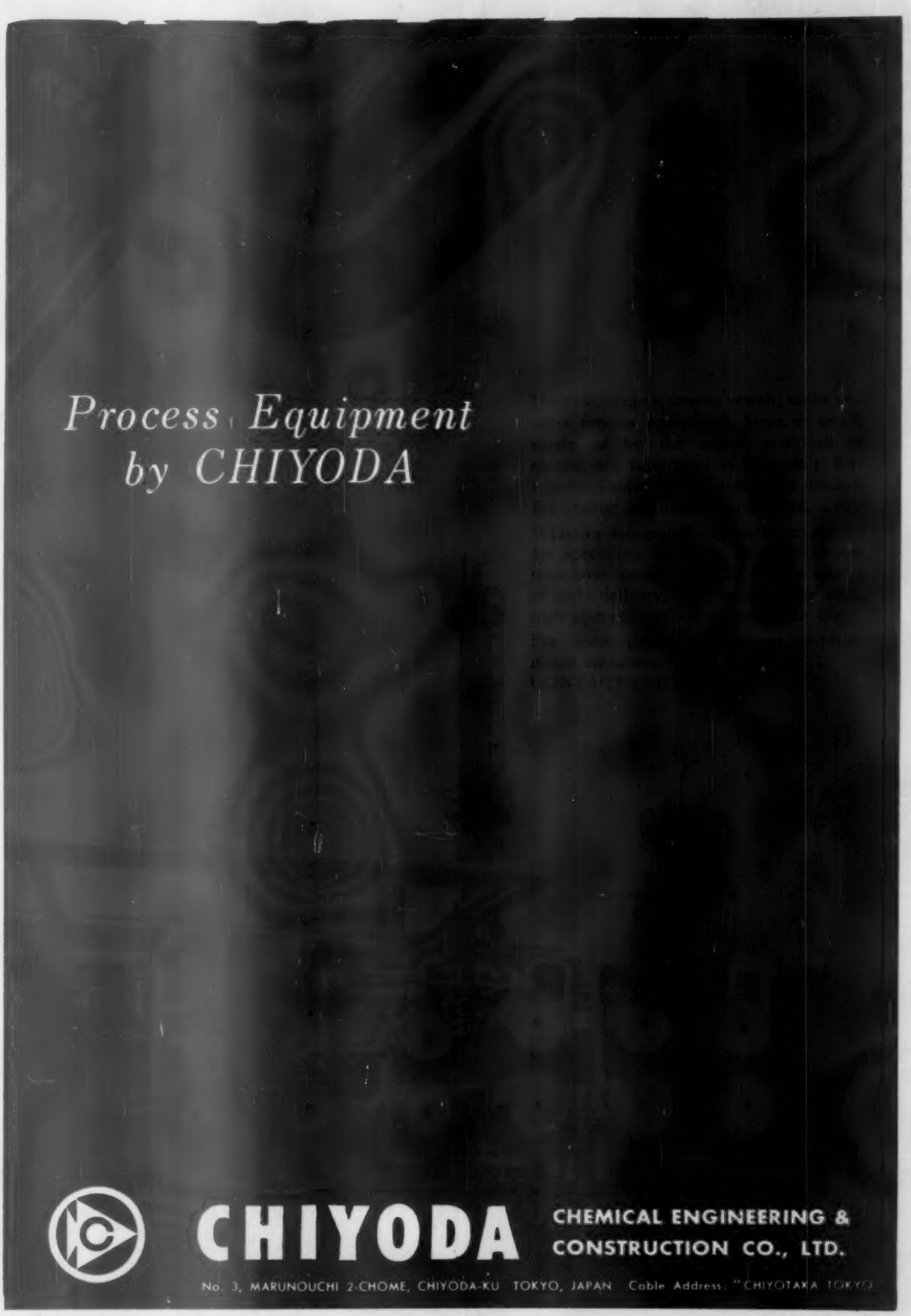
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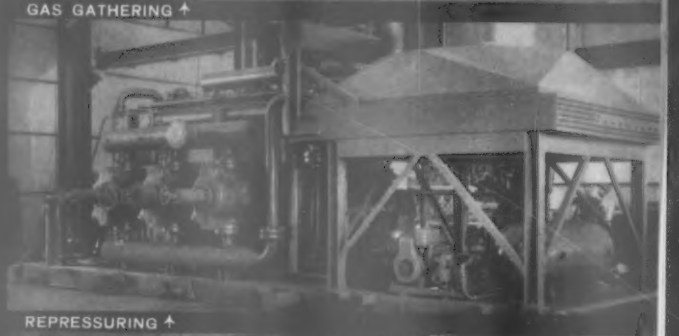

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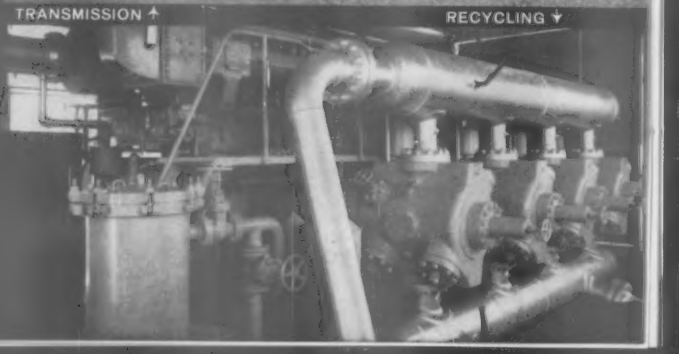

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indicated reading in accordance with ASTM requirements. Flexibility is provided by five ranges from 0-10 to 0-300 lb. These are combined on an 8-in. dial. Calibration can be in ounces, tenths of pounds, or kilos. The tester comes either with a manual handwheel or motorized. Source: **W. C. Dillon & Co., 14620 Keswick, Van Nuys, Calif.**

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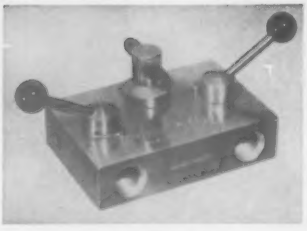

of measuring, recording, or transmitting instruments in process plants and refineries.

The maker claims the valve is leakproof and that complete absence of crossport leakage in the valve eliminates a major cause of inaccurate instrument readings. One variation of the valve provides a bleed hole that vents both instrument ports to atmosphere when the balancing valve is open.

Made of brass and Type 303 stainless steel, with operating pressures from 0 to 2,000 psi., the valve is considered suitable for use in systems containing air, ammonia, helium, hydrocarbons, natural gas, and others. Source: **Circle Seal Products Co., Inc., 2181 E. Foothill Blvd., Pasadena, Calif.**

●

Polypropylene valve

... available that handles solvents as well as acids, the maker says. The valve is lightweight, and has high-strength chemical resistance. According to the maker, it possesses excellent resistance to most solvents, greases, oils, and most common acids at temperatures up to 185° F. The throttleable gate valve comes in sizes from ½ to 2 in. with socket-weld, flanged, or screwed ends. Source: **Vanton Pump & Equipment Corp., Hillside, N. J.**

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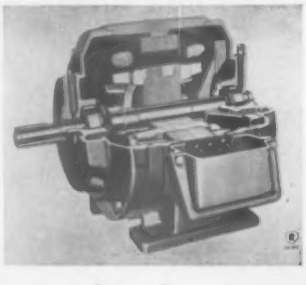

Encapsulated weatherproof motor

... called the Duty Master comes in frames 180 through 445U (1 through 125 hp.) in all standard speeds and voltages. The stator windings are encapsulated in an epoxy resin for resistance to moisture, oil, dust, chemicals, acids, and alkalies. The bearings, exposed internal metal surfaces, and certain other parts are also protected against damage from the elements and contaminating atmospheres. According to the maker, the open type of motor exceeds splash-proof motor specifications. Source: **Reliance Electric & Engineering Co., 24701 Euclid Ave., Cleveland 17.**

NEW! NEW!

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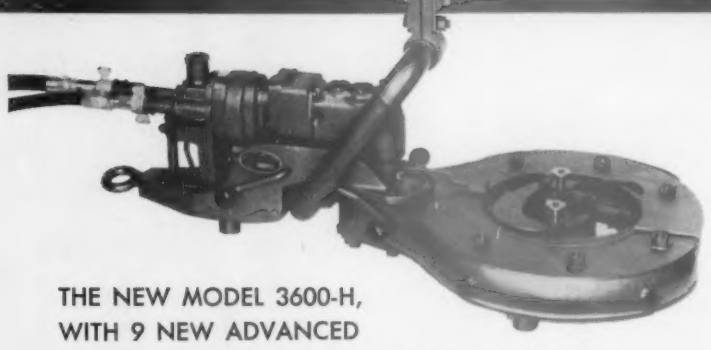
Hydraulic
POWER TUBING TONG

uniform make-up, positive break-out *on every joint*



THE NEW MODEL 3600-H, WITH 9 NEW ADVANCED FEATURES IS FAST, SMOOTH, QUIET, POWERFUL AND ECONOMICAL

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MID-CONTINENT REPRESENTATIVE FOR:
ADVANCE POWER OPERATED TUBING SPIDER

At Cities Service Oil Company's Rahway, N. J. refinery

Bitumastic Coatings outlast costly materials on tough, tide-zone piling protection

The Cities Service refinery's docking area is located on the Arthur Kill, a salt water channel with a high content of industrial wastes and debris that presents a tough corrosion problem. That's why special attention was given to the protection of sheet steel piling at the wet-dry zone.

Two types of coating systems were tried, both over sandblasted steel; one, a new type of coating using "exotic" materials, and the other, a combination of two Koppers coatings: Bitumastic® No. 50 and Bituplastic® No. 28.

Within six months, the more expensive coating was badly deteriorated, and had to be removed, while the Bitumastic coating system was still in excellent shape—and is now protecting *all* the piling. The combination of heavy-duty undercoating given by thick, tough Bitumastic No. 50 and the sunlight and water-resistance of Bituplastic No. 28 over this base was the happy answer to the specific conditions.

The right answer to many corrosion problems can be found among the ten Bitumastic coatings, since they offer a wide variety of characteristics to suit many applications. And there are three *new* coatings in the Bitumastic line that have unique properties which you may find of interest: use the coupon below for more information. Or call any Koppers Tar Products Division District Office: Boston, Chicago, Los Angeles, New York, Pittsburgh and Woodward, Alabama. In Canada, Koppers Products, Ltd., Toronto.

SEE OUR CATALOG IN SWEET'S

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another fine product of COAL TAR

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Gentlemen:

☐ Please send me information on your three new Bitumastic Coatings.
☐ Please send me more information on the Bitumastic coatings that worked for Cities Service.

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Firm_____
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another first from Reed!

THE "2-IN-1"

Comet

NEWEST OF ROCK BITS - EXCLUSIVELY REED

...actually two bits in one!

The new Reed Comet bit combines steel teeth with tungsten carbide inserts and achieves superb digging capacity with maximum crushing action. This unique new bit is tremendously effective in hard abrasive formations such as chert, sand rock, quartzite, granite, and flint.

This new bit (Reed's exclusive design) is the answer to your problems when you drill in non-uniform formations which vary from considerable hardness and abrasiveness to extreme hardness, abrasiveness, and high compressive strength.

The Reed man who calls on you has the complete story on this NEW Reed bit. He'll be glad to give you the full story on *all* Reed products.

(Available now in 7⅞", 8½", 8⅝" and 8¾" sizes.)

- BASALT
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- NOVACULITE
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REED ROLLER BIT COMPANY *Houston 1, Texas* EXPORT OFFICE: 1011 INTERNATIONAL BLDG., NEW YORK 20, N.Y.

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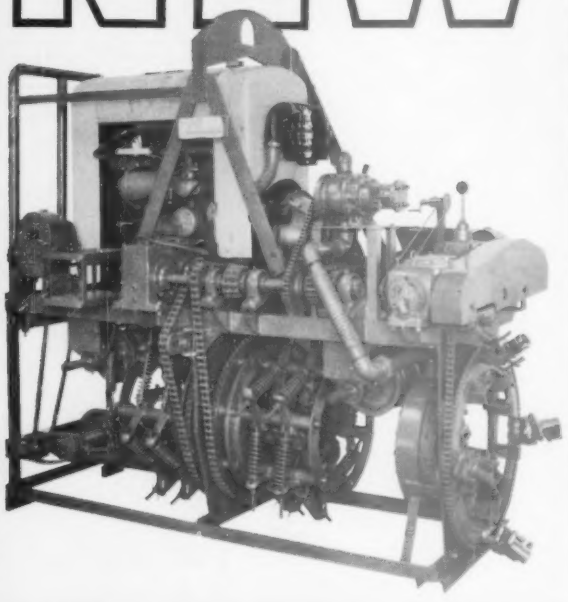
NEW



CROSE COMBINATION CLEANING & TAPE WRAPPING MACHINE

AVAILABLE IN FOUR MODELS

The New Crose Combination Cleaning and Tape Wrapping Machine has variable speed tape wrapping head; built-on blower to remove dust from pipe prior to applying tape, and baffles incorporated into machine's design to protect wrapping area from dust. Four models — comparable to the Crose Cleaning and Priming Machine — handle these pipe sizes: 2″-4″; 4″-16″; 16″-32″ and 34″-40″.

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2765 DAWSON RD., TULSA, OKLA., Phone WEbster 6-2171 BRANCH OFFICES: Houston, Texas • Elizabeth, New Jersey • IN CANADA: CROSE-PERRAULT CANADA, LTD., Edmonton, Alberta • Toronto, Ontario • EXPORT OFFICE: New York, N. Y.

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Safe: vapor and moisture tight. Always cool. Can't burn mechanic's hands. Approved by safety engineers.

Easy to use: light weight. Small diameter. Easy to grip or hang.

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In 6, 8, 13, 15 and 30 watt sizes. 18″ handles available.

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1131 Mission Street, South Pasadena, Calif.
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PROVEN – FAST AND SURE – CUPS HAVE THE LONGEST LIFE.

One-piece fluted mandrel of heat-treated alloy steel has large bypass through flutes which allows rapid fall.

TYPE P deep wells and heavy loads
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leaders for 30 years in well completion & pumping equipment

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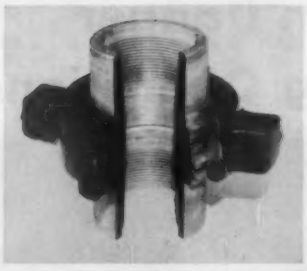
New Equipment

Newest unions

. . . make up fast and come in a 2-in. size with working pressure ratings of 4,000 and 6,000 psi. They can speed and simplify installation and maintenance of pipeline systems as they have a full, three-pitch acme thread which turns easily, resists clogging, and is easily cleaned.

According to the maker, the acme thread withstands considerably more abuse than does a conventional V-



thread. Source: **Clayton Mark & Co., 1900 Dempster, Evanston, Ill.**

●

Electrically heated gage

. . . is available for installations where there is a problem of heating various liquids to get an accurate liquid level and steam is not available. The gage is expected to prove useful where there is a need for close control of temperatures in the gage glass as well as for cold-weather applications to prevent gage freezing and breakage.

The gage employs a cartridge heater with a ½-in.-diameter stainless-steel-sheathed manganese-nickel wire. Each wire is insulated with silicone-impregnated glass. The external-tube model gage comes in reflex and transparent types equipped with electrically heated jacketed valves. Source: **Jerguson Gage & Valve Co., 80 Adams, Burlington, Mass.**

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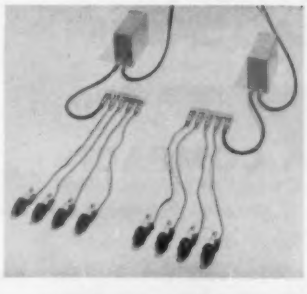

Spark-plug pickup

. . . eases tests of motor fuels. With no mechanical modification to an engine required, the 601/640 pickup measures severe surface ignition and detonation pressure, and detects borderline knocks in unmodified internal combustion engines, the maker claims. The device permits combustion pressures in all cylinders of an engine to be shown on an oscilloscope or other recording equipment. Source: **Kistler Instrument Corp., 15 Webster, N. Tonawanda, N. Y.**

OIL & GAS PROPERTIES TECHNICAL SERVICES CO., INC.

Announces Following Services available in Rocky Mountain Area Specializing in:

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Recognized as a basic book on petroleum laboratory technique, "UOP Laboratory Test Methods for Petroleum and Its Products," is now available in a new fourth edition. A valuable supplement to standard ASTM, APHA and API test methods, this 618-page edition details 89 test procedures of great practical value to refinery laboratories.

The book includes spectrophotometric and gas-liquid chromatographic procedures; analytical methods for determination of trace metals, nitrogen and sulfur compounds in hydrocarbon streams; distillation methods and other useful tests. All test methods reflect the latest practices of UOP's research laboratories. Illustrations include the more complex apparatus, typical calibration and working curves, nomograms and graphs.

Copies of the new edition are available at $25 (U. S.) each, postpaid. Order directly from:

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MAXIMUM BURNER STABILITY FOR MAXIMUM SAFETY

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Combustion chamber is designed to minimize the formation of partially oxygenated and corrosive compounds

SIMPLE . . . RUGGED . . . COMPACT

The John Zink inert gas generator is so compact it requires less floor space than any other comparable unit.

Flanged components are used throughout for easy servicing. Each part may be removed without interfering with any other part.

The easy, economical way to provide maximum safety and efficiency for your plant and personnel in purging, storing, conveying and controlling in a variety of process operations.

WRITE FOR BULLETIN G-59

John Zink COMPANY

4401 S. PEORIA TULSA, OKLAHOMA

SHOWCASE . . .

New Literature

Seamless light-wall tube

. . . called Strubing, is the topic of a free eight-page brochure. Produced in most metals, it is processed in strip form and rolled up for compact shipment. The brochure outlines economies of packing, shipping, and storing of the product; explains how mechanical techniques are used to expand the strip into tubular form; and discusses alloys, method of fabrication, and size range. Source: **Wolverine Tube Div., Calumet & Hecla, Inc., 17200 Southfield Rd., Allen Park, Mich.**

Free steel-pipe data chart

. . . covers pipe dimensions and weights and offers 14 different schedules. Data for stainless pipe is shown where the wall thickness specified for it differs from that of carbon pipe. For added convenience, a table is provided showing the capacity of round tanks. Formulas for calculating capacities of rectangular and elliptical tanks are also included. Source: **Peter A. Frasse & Co., Inc., 17 Grand St., New York 13.**

Centrifugal air compressor

. . . known as "Isotemp," for air-separation plants and industrial use, is introduced in new 20-page Bulletin 175. It gives engineering data which should help you to estimate horsepower requirements for different uses. Included are illustrations and descriptions of all major design features. Source: **Clark Bros. Co., Olean, N. Y.**

Force control

. . . switches which operate in compression or tension and which can trigger as many as four separate operations, are illustrated in new six-page Folder 49E. Prices and engineering data are offered on the switches which are designed to start and stop motors and relays, sound audible warnings, or activate visual signals. Source: **W. C. Dillon & Co., Inc., Box 3008, Van Nuys, Calif.**

Connecting-rod

. . . realigning service for industrial-engine and automotive users is out-

U-36 DESERT RIG for LIBYA

The Mid-Continent U-36 Drawworks, powered by Cummins VT-12 diesel engines with Torcon converters, features an 18" O.D. by 45" long drum and 44" by 10" water circulating brake rims.

After moving the drawworks trailer, this unique substructure is raised, the wheels swing into position and are pinned to give 18 inches of roadbed clearance.

Huge "sand-flotation" tires, each measuring 63 inches in diameter and 23 inches in width, are mounted on the trailers to assure safety in moving across the sandy desert terrain.

The utility trailer carries two Cummins model HRG-G diesel engines with 75KW AC generator sets, and other auxiliary equipment.

W3-0

MID-CONTINENT RIG

Specifically designed for desert use

Mid-Continent U-36 trailer mounted rigs have recently been located in Libya by a major oil company and a major drilling contractor. Specifically designed for desert use, the drawworks, mast, mud pumps, utility unit and substructure are each fitted for separate trailers. Highly portable, and with a flexible drilling range ideally suited for Libya's desert operations, the versatile Mid-Continent U-36 is indeed the "hottest rig" for this most active oil country. For complete information, write for the U-36 Bulletin or contact your Mid-Continent representative.

MID-CONTINENT – SUPERMARKET FOR THE OIL IND TRY

MID-CONTINENT SUPPLY CO.

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

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"GREAT CARE MUST BE TAKEN IN SELECTING A GASOLINE ADDITIVE"

FMC offers Dependability, Manufacturing skill, Choice of products for Gasoline Additives

Dependability – FMC protects the refiner by producing ignition control additives from basic raw materials...assuring you of optimum quality control throughout the production process, and providing you with a dependable source of supply for these products.

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Choice of products – FMC offers you several phosphorus compounds for consideration as combustion deposit modifiers . . . will soon be in a position to supply new compounds, enabling you to choose the additive best suited to your particular conditions.

If you need a phosphorus additive to eliminate engine knock, reduce surface ignition and spark plug fouling, you can rely on the experience and facilities of FMC. Write for more information about FMC gasoline additives. We will be glad to show how these products can meet your most exacting specifications.

Putting Ideas to Work
FOOD MACHINERY AND CHEMICAL CORPORATION
Chemicals & Plastics Division

Sales Dept., 161 East 42nd Street, New York 17, N.Y.

lined in a 2-page leaflet just made obtainable. It states that connecting rods can be accurately realigned to micro-adjusted center-to-center lengths (pin end bored parallel to the crankend) without changing the metal structure. Source: **Center Precision Co., 614 N. Rockford, Tulsa.**

Truck-mounted and floor cranes

. . . four-page Folder W-102 gives specifications of different sizes and types of cranes from 500 to 4,000 lb. The literature outlines hand-operated winches with capacities from 500 to 2,000 lb. It also lists hand-winch specifications and limitation ranges. Source: **H. S. Watson Co., 1316 67th St., Emeryville 8, Calif.**

Packing selection

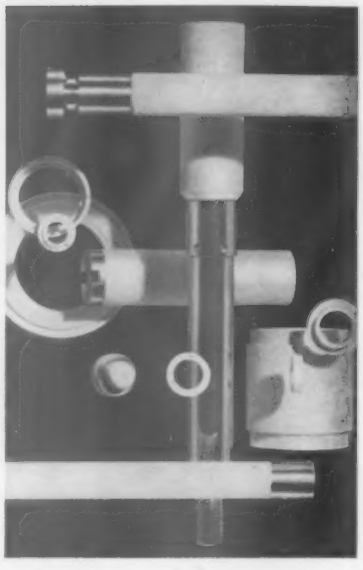
. . . can be simplified by using a packing-recommendation chart which lists the proper packing types from which to choose for specific applications. Suitable for posting on a wall, the new stiff-paper chart suggests seven basic packing types for about 95% of all packing needs, including such applications as: pumps and valves, high-temperature valve stem and expansion joints, high-speed rotary air compressors, corrosive and viscous liquids, chemicals, gasket applications, and hydraulic and pneumatic equipment. Source: **Packing Div., Raybestos-Manhattan, Inc., Passaic, N. J.**

Aluminum

. . . buyers guide presents quick facts on aluminum coil, sheet, plate, tubing, pipe, rod, and bar available from stock with a guide to selection. Technical Bulletin 30-1 describes aluminum building products and includes federal specifications, analyses, mechanical properties, tolerances, machinability ratings, finishes, corrosion resistance, and relative costs of aluminum alloys. Source: **Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80.**

Microprocessing

. . . equipment Bulletin MP-1 presents precision-built units for removing solid, liquid, or vapor contaminants from fluid systems. A cutaway and brief description of each unit show how the application of microporous materials removes contaminants in micron size and small quantities from systems for which it is designed. Source: **Selas Corp. of America, Dresher, Pa.**



Leading Oil Field Pump Manufacturers Use Coors Alumina Ceramics to Fight Abrasion

Leading pump manufacturers are supplying plungers of Coors Ceramic, because they wear several times longer than plungers of expensive metals.

Coors Alumina Ceramics are extremely hard—equal to a sapphire in hardness. This property makes the plungers very resistant to abrasion. The ceramic is virtually inert to chemicals—it does not corrode nor pit in service. It has a tensile strength of 17,000—18,000 PSI and a compressive strength of over 240,000 PSI.

Coors Alumina Ceramics are also used for rock bit nozzles, chokes, ball check valves, and sleeve protectors for multiple completion wells.

Chokes of Coors Ceramics are available through oil field stores. Pump plungers and other ceramic parts are available only through equipment manufacturers. If you are having abrasion or corrosion problems, ask your equipment manufacturer about Coors Alumina Ceramics!

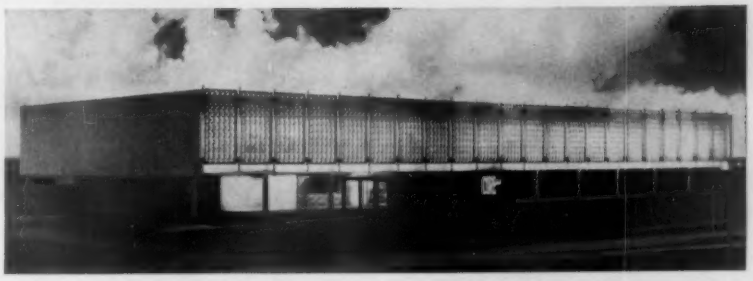
Coors
Alumina Ceramics
COORS PORCELAIN COMPANY
600 NINTH ST., GOLDEN, COLORADO

▶▶▶ Equipment Men Notes

Plastic Applicators, Inc. opens

. . . a new sales and service office in Jackson, Miss., and names Dabbs Long to head operations in the area. Long's experience in the industry spans 11 years, including oil-well completion and geophysical operations as well as general oil-field work. Prior to joining the pipe-coating firm, he was with Lane Wells Co.

In his new capacity, Long will also represent Pipe Inspectors, a division of Plastic Applicators, specializing in inspection services for casing, tubing, and drill pipe used in exploration and production.



NEW HOME OFFICE and laboratory facilities of Core Laboratories, Inc., are located on a 4-acre tract in Dallas. The petroleum reservoir-engineering firm, which previously occupied six separate buildings in the town, now has centralized its administrative, engineering and consulting, special core analysis, reservoir fluid, data processing and computing, research, accounting, and equipment development-maintenance departments. The $750,000 investment was financed by Core Lab's employe-pension fund, and climaxes a 5-year expansion and modernization program.

Expansion program is announced

. . . by Southwestern Industrial Electronics Co., one of the Dresser industries, which will require the company to add more than 1,000 technically trained people in engineering during the next 5 years.

At the same time, George Peck, SIE president, reported that Howard S. Gleason will be named vice president of manufacturing, and that John C. Black, Jr. has been appointed manager of the field service department. Gleason was formerly assistant to the president. Black recently joined the company from Federal Electric Corp., Paramus, N. J.

Lee C. Moore Corp. is host

. . . to a group of engineering students of the Industrial University of Santander, Bucaramanga, Colombia, during a 3-day tour of some of Tulsa's oil-field-equipment manufacturing facilities. The Moore corporation was assisted by Pan American Petroleum Corp., Bethlehem Steel Co.'s Supply Division, Kewanee Oil Co., and Petroleum Publishing Co.

Smith Oil Tool Co. elects

. . . Donald E. Graham president of the company, succeeding H. C. Smith, organization founder, who was named chairman of the board. After joining the firm in 1952, Graham was appointed vice president in charge of manufacturing in 1956. The following year he became administrative vice president and assistant to the president. Two years ago Graham was elected executive vice president.

D. E. Graham

H. C. Smith

Lucey Products Corp. sets up

. . . a new division—the Refinery, Chemical Plant, and Pipeline department—to offer equipment and materials for various types of work projects to operating companies and to engineering and construction firms. The new enterprise is headed by C. Ray Grosvenor, with headquarters at Lucey's home office in Tulsa.

Delta Tank Mfg. Co. appoints

. . . two new sales representatives for its oil-field equipment division in the persons of Ralph Kemp, Jr. and George C. Allen. Kemp will serve in the Midland, Tex. area. Allen will headquarter in Houma, La.

Morris Sievert named manager

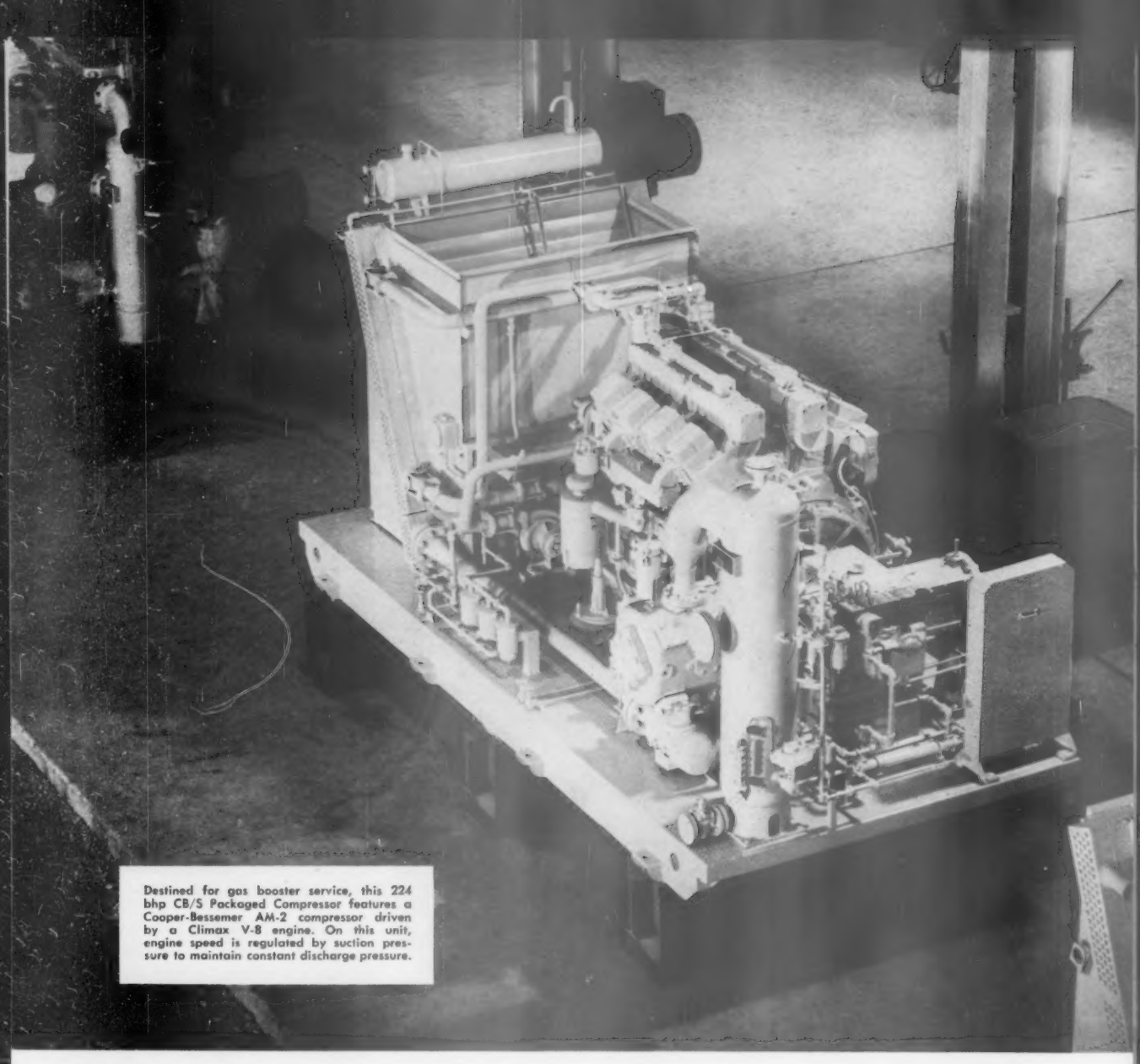
Morris Sievert

. . . of turbomachinery sales for Solar Aircraft Co., in which post he will manage sales of gas-turbine engines, compressors, and related equipment, reports L. D. Richardson, vice president in charge of sales. Sievert has served in turbomachinery sales with Solar the past 3 years. Previously he was district territory sales manager for Elliott Co.

MODERN STORE BUILDING of National Supply Co. has been erected in Lawrenceville, Ill. It combines a sales room, offices, warehouse, pump shop, and loading dock. The location provides parking space as well as room for a pipe yard, pumping-unit storage, and used-equipment yard. L. B. Strange is manager.

Two new sales offices opened

. . . by Datamatic Division of Minneapolis-Honeywell Regulator Co., announces Walter W. Finke, division president. The offices are located in



Destined for gas booster service, this 224 bhp CB/S Packaged Compressor features a Cooper-Bessemer AM-2 compressor driven by a Climax V-8 engine. On this unit, engine speed is regulated by suction pressure to maintain constant discharge pressure.

Building packaged compressors is our business . . . our only business. This single objective is the reason CB/S Packaged Compressors are more advanced in design . . . more efficient in the field.

CB/S PACKAGED COMPRESSORS

CB/S

C-B SOUTHERN, INC., P. O. BOX 19267, HOUSTON 24, TEXAS

A subsidiary of The Cooper-Bessemer Corporation.

Atlanta, Cincinnati, Cleveland, Houston, Minneapolis, Philadelphia, Pittsburgh, San Francisco, Portland, and Albany.

Gene P. Robers is appointed

G. P. Robers

. . . general sales manager of Thermoid Division of H. K. Porter Co., Inc. He will locate at the division's headquarters in Pittsburgh, announces R. W. Christenson, division vice president and general manager. Robers takes to Porter nearly 20 years of experience in the automotive and industrial-equipment field. He formerly was a vice president of Carter Carburetor Division of ACF Industries, Inc. Prior to that he was general sales manager of Weatherhead Co.

Western Supply Co. opens store

. . . in Denver and appoints two men to operate the new outlet.

Robert E. Green, former vice president and general manager of E. W.

R. E. Green

Richard Henke

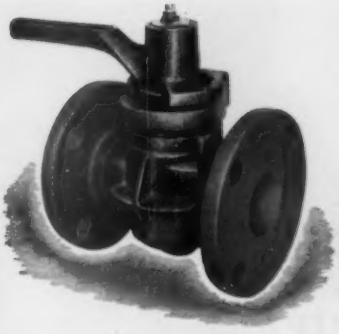
Robinson Supply Co., Denver, has been named manager. Associated with him is Richard Henke, also formerly with the Robinson company. Both men will report to Paul J. Evershade, vice president of Western's Gulf Coast operations.

J. W. Robbins takes on position

. . . as marketing manager for Parkersburg Rig & Reel Co.'s production equipment plant in Houston. There he will be responsible for engineering, manufacturing, production, and all sales services, including pricing and advertising.

Robbins, former vice president and general sales manager of Parkersburg, joined the company in 1940 as assistant warehouseman in Odessa, Tex. He then became warehouseman, branch manager, district manager, area manager, and general manager of the company's Drilling & Specialties Division.

Another Parkersburg appointment involves S. S. Smith, named sales man-



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POSITIVE SHUT-OFF •
FREEDOM FROM
MAINTENANCE •
EASY OPERATION •
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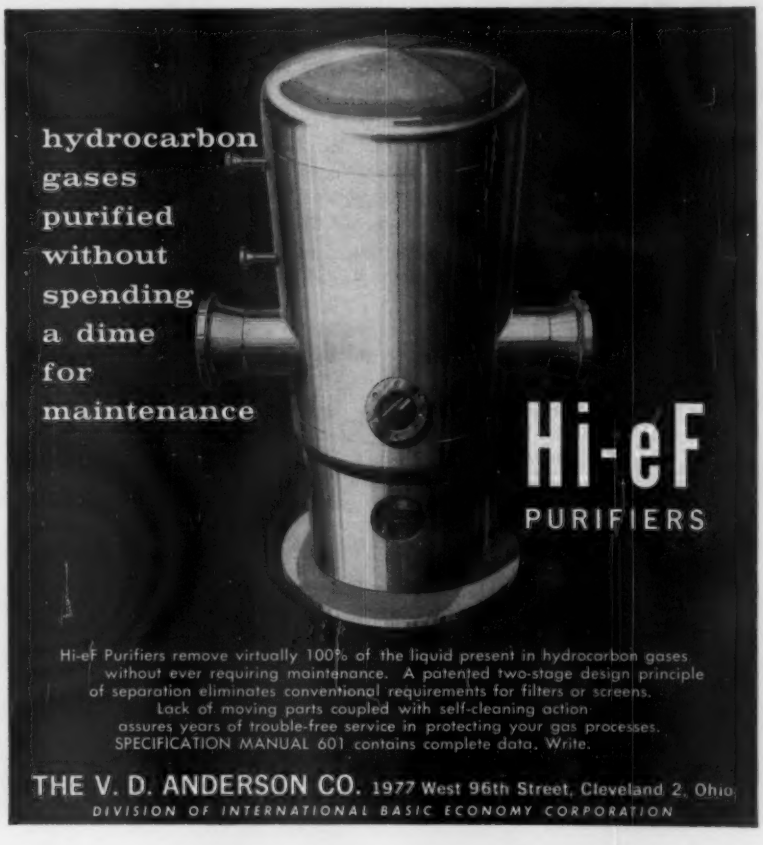
SERVICE • RESISTANCE
TO CORROSION or EROSION

This DeZurik Valve will deliver more valve value than any other valve!

In sizes from ½" thru 24", with a complete line of actuators for remote and automatic operation. Write for details, or see the DeZurik representative in your area.

DeZURIK CORPORATION
SARTELL, MINNESOTA



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75 miles from shore--in 40 minutes

Nothing matches Petroleum Helicopters' new Sikorsky S-62 for safe, smooth, fast transport in Gulf offshore oil operations

When the S-62 puts down on the rig's landing platform, it's a case of "love at first flight" with roughnecks and pilots alike. The omniphibious S-62 can operate from land, water, swamp or shipboard. For passenger safety and peace of mind, its sturdy boat hull is indispensable in Gulf flying—even a choppy sea is no problem in water landings.

The dependable turbine engine, quieter than the piston type, packs power to spare. The S-62 can hover and land on the rig's 70-foot-square platform safely and surely, even under adverse conditions. Cruising at over 100 mph, it flies two and a half hours without refueling—for long haul operations, turbine fuel can be safely stored on rigs.

Smooth? Ask any of Petroleum Helicopters' pilots who have flown it! Ease of handling, lack of vibration and low noise level cut fatigue in a flying operation where long hours are the rule.

Work crews, too, are enthusiastic about the speed and comfort of the S-62. No more of those ten-to-twelve-hour boat trips. In little over half an hour, the S-62 puts a new shift on the job—fresh, relaxed, ready for work.

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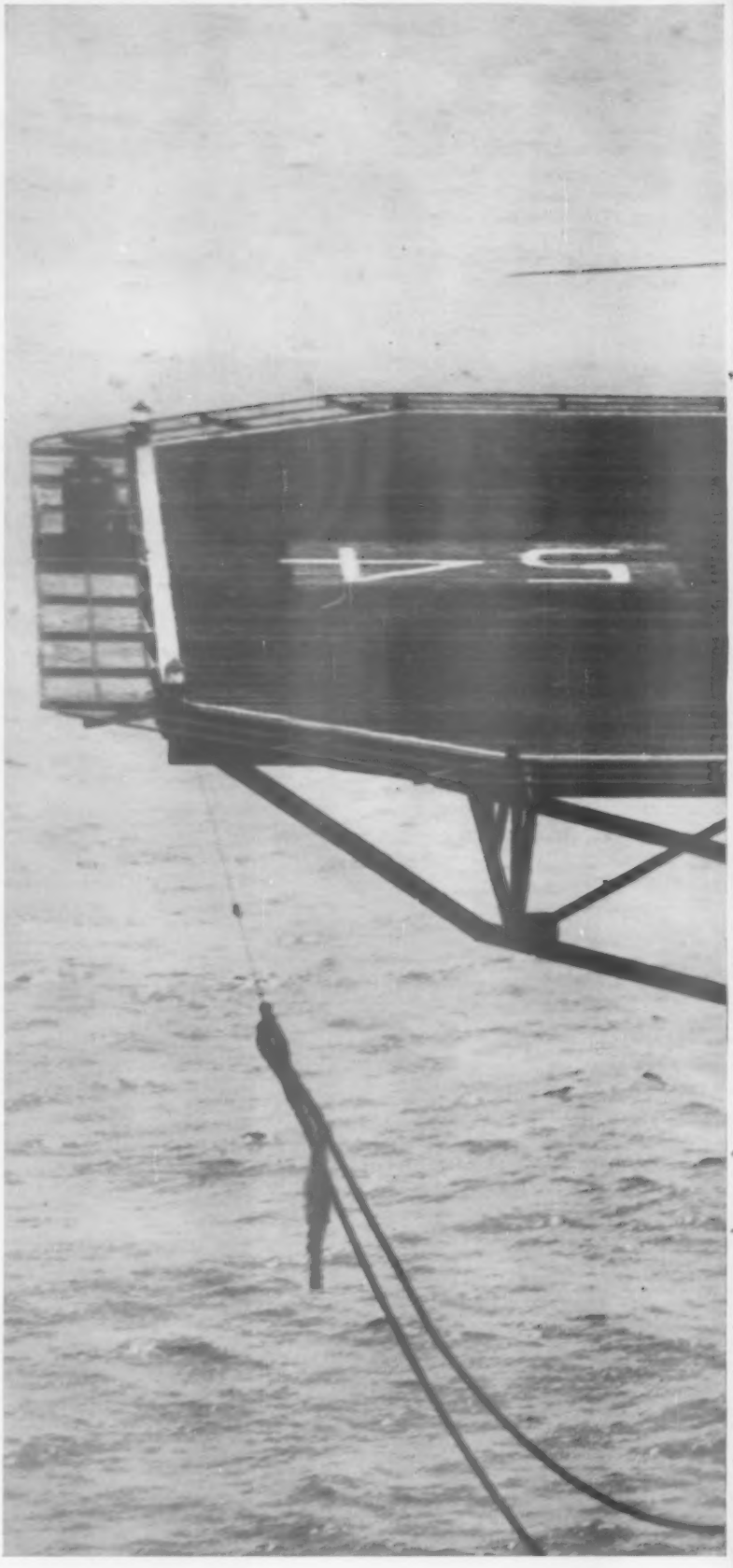

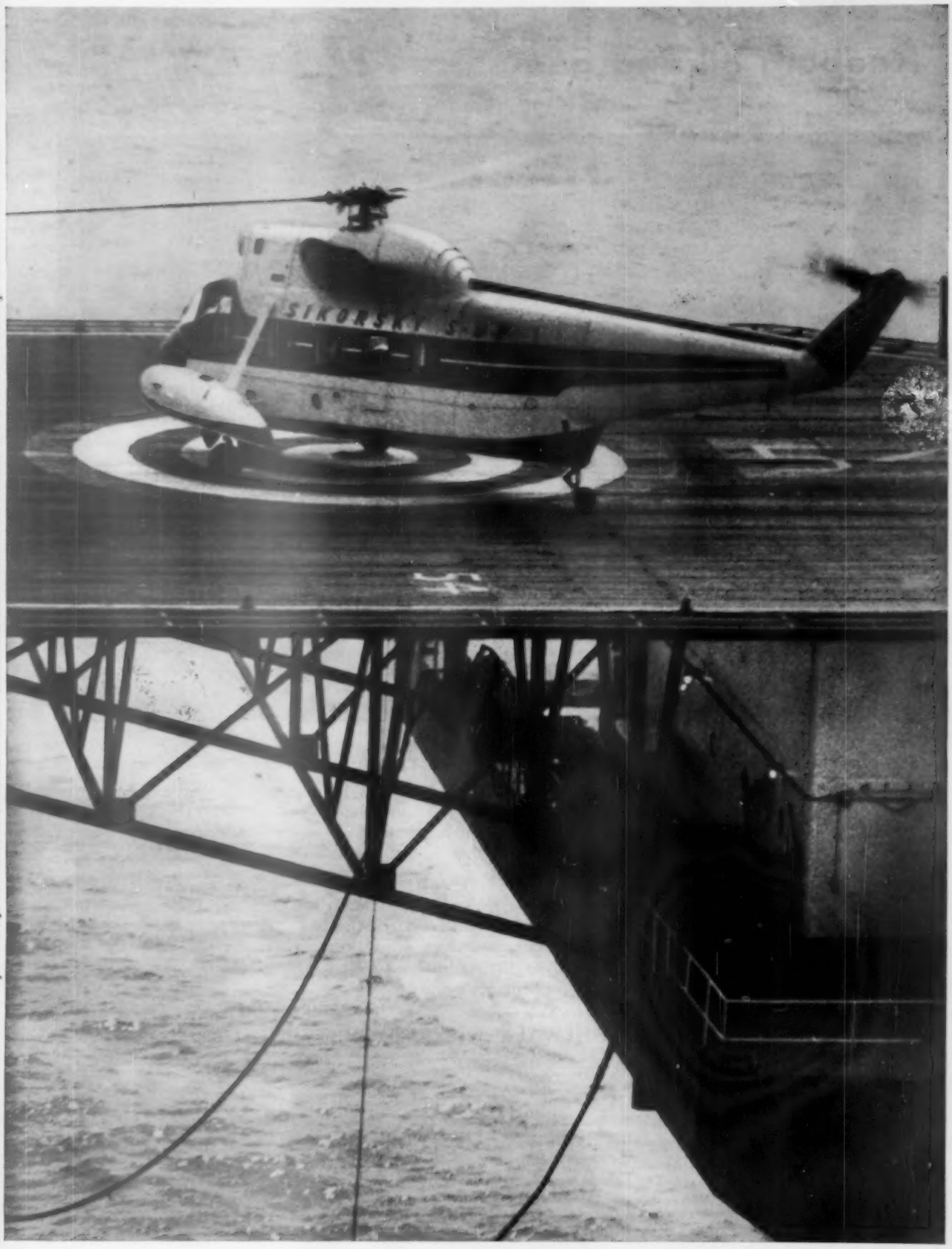
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Your Profit-Pipe is LIGHTWALL by SOUTHWESTERN

It gives you heavyweight performance for less money: lower initial cost, ease of installation, flexibility, greater flow-through and long trouble-free service.

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ager for the Rocky Mountain division with headquarters in Denver. He joined the firm in 1955 and was assigned to the Wichita Falls, Tex. office. Prior to becoming division sales manager, Smith was a company salesman in Denver.

Daystrom, Inc. promotes eight

H. L. Cutler

. . . in the systems sales and engineering group of its Control Systems Division. Systems sales manager appointments were made to Harry L. Cutler, James S. Burr, and Thomas Waldrop. The three, along with Thomas R. Hudson, promoted to technical consultant, will work out of the division's headquarters in La Jolla, Calif.

J. S. Burr

Thomas Waldrop

Four area representatives were named systems engineering coordinators: Robert R. Burns, Washington, D. C.; W. Martin Lyford, New York City; Robert Richards, Atlanta; and Alden H. Webber, Berthoud, Colo.

Magnet Cove Barium announces

G. H. Moore

. . . a series of personnel changes in its drilling-mud department, marketing division, according to I. W. Hoskins, senior vice president—marketing. George H. Moore, former manager of the industrial sales department, has been named to the newly created post of assistant vice president—marketing. In this capacity he will assist Hoskins in sales within the domestic drilling-mud department, the foreign sales department, and the industrial sales department.

Other changes include: Ray E. Dillman, former regional sales coordinator, now an assistant sales manager in the northern area; R. M. Edwards, assistant sales manager in charge of the Houston sales office; L. B. Gale, Jr., distribution manager, a staff function responsible to the drilling-mud

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An imaginative solution to your piping problems

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Bondstrand's light weight and ease of assembly can save up to 50% of installation costs. Actual cost records of typical applications prove that the total installed cost averaged only 1.3 times that of carbon steel pipe. By eliminating the corrosion problem and down time for replacement or repair, Bondstrand saves many times its slightly higher initial cost.

Bondstrand is now available in sizes from 2" through 8" with all necessary couplings and fittings. Larger sizes available on special order.

Write for bulletin containing complete data, including physical properties, chemical resistance, flow rates, and other design information.

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department sales manager; and Myron Robertson, assistant regional sales manager of the northern division, replacing Delbert C. Brooks. Brooks has been transferred from Oklahoma City to Tulsa and reclassified as assistant to the regional sales manager.

John J. (Jack) Griffin appointed

J. J. Griffin

. . . sales manager of the industrial burner division of John Zink Co., Tulsa manufacturers of industrial and domestic heating equipment. His job will include directing sales activities in the petroleum processing, petrochemical, and chemical fields. Before joining Zink, Griffin was chief engineer for National Airoil Burner Co. for 8 years, and was with Petro-Chem Engineering Co. for 6 years.

Meanwhile, Harold F. Koons has joined the Zink staff as a sales engineer. He previously worked for Refinery Engineering Co., Derby Oil Co., Jones & Laughlin Steel Co., and Mid-Continent Pipeline Co.

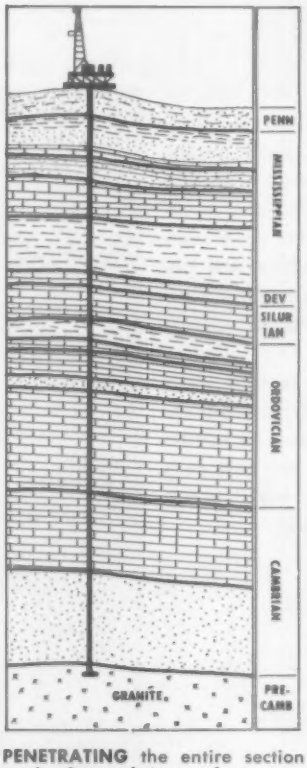
Baash-Ross shifts J. L. Ward

. . . from Casper, Wyo., to Edmonton, Alta., to handle sales in northern Alberta and British Columbia. The announcement was made by Gordon Morrison, Canadian area sales manager for the division of Joy Mfg. Co.

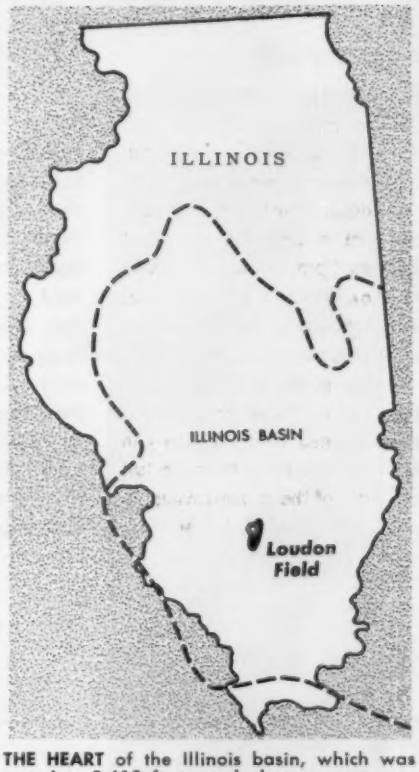
Outgoing president is honored

. . . by members of the Petroleum Equipment Suppliers Association as Wallace Wilson (right) receives a plaque commemorating his 1-year tenure in office. Newly elected PESA President Elliott Johnson (left), vice president and general counsel of Schlumberger Well Surveying Corp., made the presentation at the organization's annual meeting held recently at Banff, Canada. Wilson is president of Wilson Supply Co., of Houston.

THIS RIG drilled Humble's well, the deepest test in Illinois, by . . .



PENETRATING the entire section to the Precambrian rocks in . . .



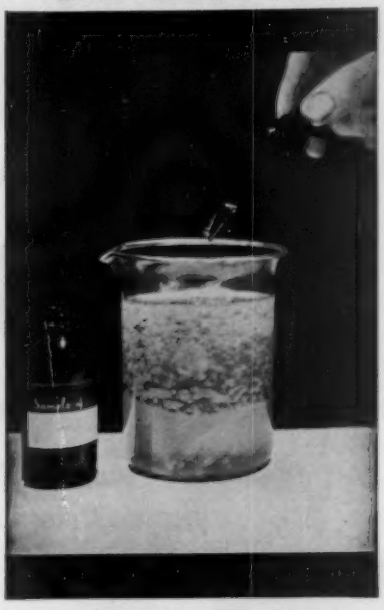
THE HEART of the Illinois basin, which was tested to 8,613 ft. to seek deeper pays.

Humble granite wildcat is deepest Illinois test

A RECENTLY DRILLED wildcat well in the Loudon field area of the Illinois basin became the state's deepest test. Humble Oil & Refining Co. 1 Weaber-Horn unit was finaled in Precambrian rocks at a total depth of 8,613 ft.

The site spots in 28-8n-3e, Fayette County, Illinois. The former state depth record was drilled in 1952 at the Superior Oil Co. 17 Ford C well in White County. This was completed as an oil well in the Mississippian-Salem after plugging back from Ordo-

MUD REMOVAL?



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Mudban* is a Dowell product used to help remove mud cake and excess drilling mud from wells; and to help remove mud lost to producing formations. It is added to the oil used in well clean-out work. Mudban is effective on almost all types of muds. It is a non-acid mud dispersing agent. Mudban is low-cost too. Be ready. Keep a can of Mudban on hand. Available in 10-gallon steel drums from all Dowell stations.

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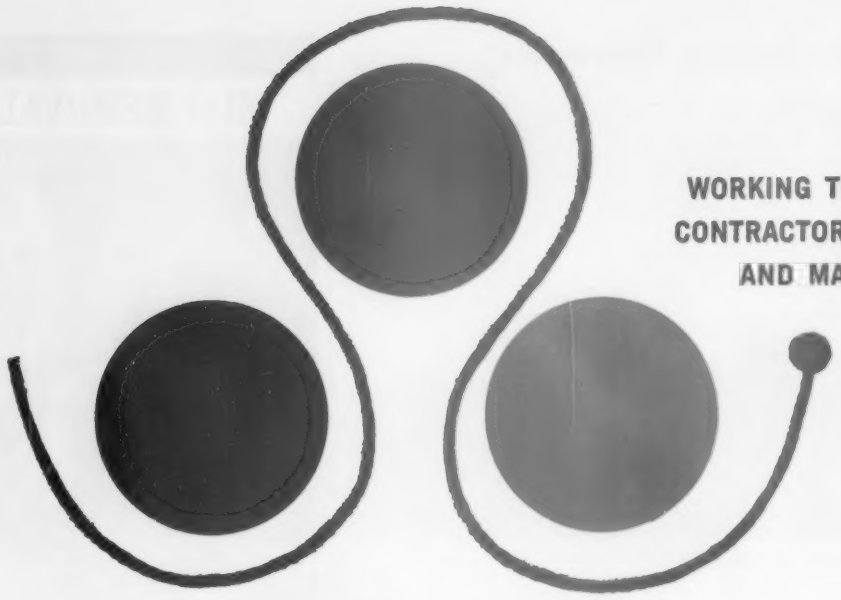


WORKING TOGETHER... CONTRACTOR, PRODUCER, AND MAGCOBAR

plan mud programs for pay and profit

High drilling costs can be cut by efficient use of drilling fluids. The right drilling chemicals, **used right** by Magcobar engineers, can help increase penetration rates, save on trips and bits, reduce materials needed, and save on equipment and manpower.

But, to make sure that the mud program is the most efficient, it must be planned from the beginning. And, because it must deal with so many specifics, it can be developed only with the close cooperation of producer, contractor, and Magcobar engineer. A sound mud program must be based on product performance, formations to be drilled, and, very important, type of equipment to be used.

By working together, a planned mud program can be developed to make full use of the money-saving advantages of Magcobar Technology. This Technology formulates special drilling fluids to reduce or prevent damage to the pay, resulting in quicker completion, higher production, and less need for expensive stimulation work. Magcobar Technology can help you as a contractor to drill wells more cheaply, can help you as a producer to have better wells. Drill your next wells with Planned Mud Programs with Magcobar.

Magcobar
Complete
DRILLING MUD SERVICE

vician-St. Peter, total depth, 7,682 ft.

Noble Drilling Co. Tulsa, was the contractor and moved in an Oilwell 76 rig from western Oklahoma, a 600-mile trek. The well was spudded in May and completed in mid-August. Shows were encountered in two zones on the way down. A favorable drill-stem test in the Trenton was run and another formation, the St. Peter at 4,460 ft., had dead oil stains in the upper 1 ft. of section.

Moving the rig was a study in logistics. Twenty-eight powerful diesel trucks required a week to make the move. Component parts of the unit include a 131-ft. Lee C. Moore mast, a 14-ft. substructure, two Superior 65-10 engines, a C-350 and C-250 National pumps, and three steel mud pits. Upon reaching the drill site, the tall mast towering above the countryside was a tourist lure and attracted people from nearby communities.

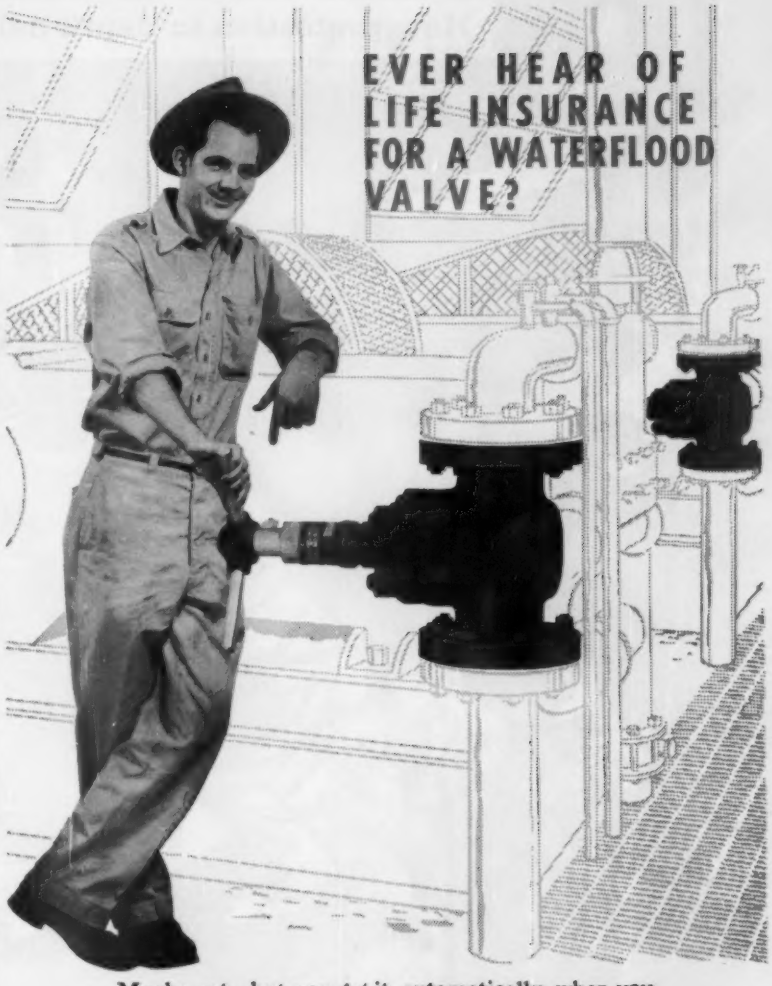
Active Rigs*

	Rotary	Cable	Total†
Alabama	4	1	5
Alaska	7	0	7
Arizona	1	0	1
Arkansas, South	22	0	22
California, Offshore	6	0	6
Inland	128	1	129
Colo., excl. Four Corners	24	3	27
Four Corners	11	0	11
Florida	2	0	2
Georgia	3	0	3
Idaho	0	0	0
Illinois	37	17	54
Indiana	13	23	36
Kansas	108	6	114
Kentucky, West	4	45	49
Louisiana, North	98	0	98
South Inland	233	0	233
Offshore	60	0	60
Michigan	47	41	88
Mississippi	65	0	65
Nebraska, West	27	0	27
Nevada	5	1	6
New Mexico, East	74	30	104
West	43	11	54
North Dakota	18	0	18
Oklahoma, Panhandle	25	9	34
Oregon	1	0	1
South Dakota	1	1	2
Texas, Offshore	1	0	1
East	55	1	56
Upper Gulf Coast	94	0	94
North	102	1	103
Panhandle	46	10	56
S.W., Corpus Christi	122	0	122
S.W., San Antonio	36	6	42
West	189	14	203
West Central	82	18	100
Utah, North	29	1	30
Utah, South	14	0	14
Washington	1	0	1
West Virginia	4	212	216
Wyoming	65	3	68
Reported U. S. Total	**1,907**	**455**	**2,362**

*Report to AAODC by the International Oil Scouts Association.

†As of August 5, 1960.

No reports from: Iowa; Missouri; Montana; Nebraska, East; Oklahoma, excl. Panhandle; Ohio.



Maybe not—but you *get* it, automatically, when you specify the Demco Valve for waterflood operations! Because Demco's unique design and construction give you *built-in insurance* for longer, troublefree valve life against the highly-corrosive qualities of salt waterflooding. With Demco's high-pressure gate valve, you get a positive rubber-to-metal seal—tough synthetic rubber against corrosion-resistant stainless, Monel, aluminum bronze or ductile iron.

And the Demco Valve seals drop-tight without applying undue torque to the stem! The body remains in line while the entire inner assembly lifts out for easier, faster inspection. Fewer parts are subject to wear. Design allows constant self-lubrication of stem threads, protection from abrasives by *double* stem seal.

Countless troublefree installations have proved this versatile valve's rugged performance under the most difficult waterflood conditions. Why not let the Demco Valve's "life insurance" work for you, too?

Available at supply stores everywhere in 1,000, 2,000, 3,000 and 5,000 psi working pressures . . . in two-to four-inch sizes.

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DEMCO

How protection in depth helps cut compensation costs

Making hazardous work less hazardous

Making up a joint is rugged work. Handling the slips and drill pipe, throwing chain and operating the tongs are all hazardous functions on the derrick floor. Poor housekeeping and lax maintenance needlessly add to the risks. By checking your rig carefully and pointing out these hazards, a Liberty Mutual engineer can help you improve your odds against worker injury and loss. This is but one of the many Liberty Mutual services that add up to protection in depth. To learn more about Liberty's protection in depth and how it can help lower your business insurance costs, get in touch with your nearest Liberty Mutual office.

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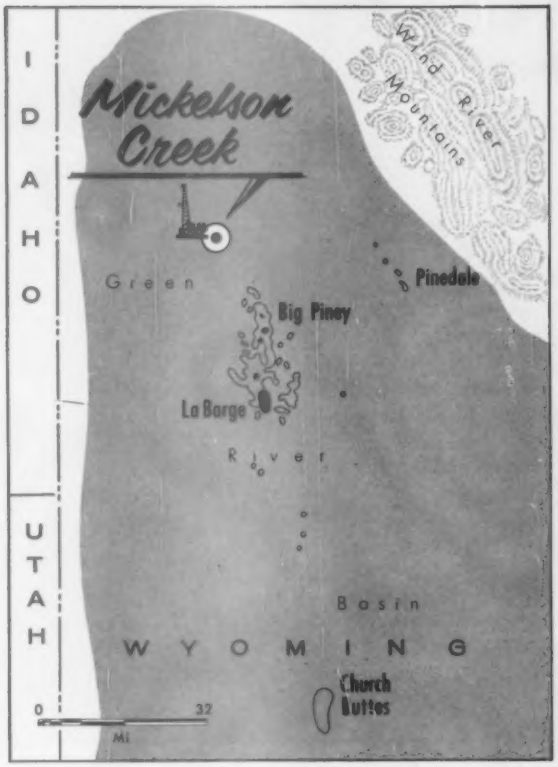


TWO WILDCATS were necessary to unlock the long-kept oil secrets of the northern end of Green River basin . . . the first was dry, the second flowed oil.

Green River becomes greener oil pasture

. . . as rare Mesaverde oil comes to Wyoming's most complex wildcat province—the Overthrust belt.

BY JOHN C. McCASLIN

THERE IS NEW exploratory excitement in the Rockies' leading wildcat arena: Green River basin. This time the show stealer is on the little-known northwestern overthrust belt side of the basin instead of on the eastern slab where Arch and Patrick Draw units have popped up as the top drilling areas in the mountain states.

The second try. Raymond I. Smith completed the northernmost producer in the Green River basin at 2 Mickelson Creek unit in NE SW 29-32n-114w, Sublette County, Wyoming, flowing 360 bbl. of oil daily through 22/64-in. choke from Mesaverde perforations at 3,536-49 ft. and a 4-in. window at 3,546 ft.

Smith's discovery was a second attempt to bring production to this remote and geologically mixed-up wildcat frontier on Wyoming's westside. Last year the first well on the unit, 1 mile northwest, was quit after recovering up to 35 bbl. of oil and 16 bbl. of water in 8 hours from the Mesaverde. Now with the No. 2 under his belt as an oil strike, Smith will try again at 3 Unit in NE SW 29-32n-114w. This newly announced well will go to 6,000 ft. and Hilliard Upper Cretaceous.

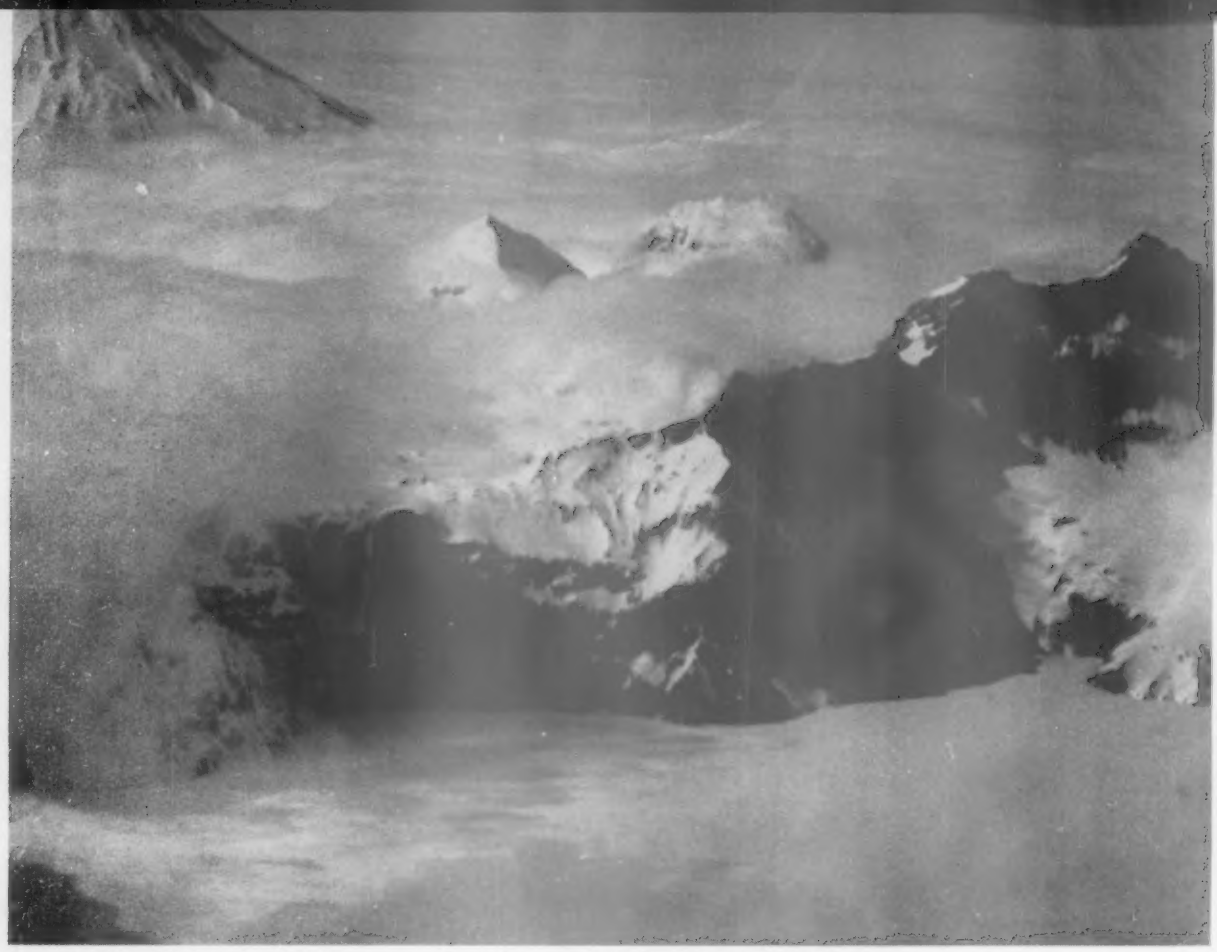
In overthrust country. This nook of Wyoming is one of the most complex geologic and structural provinces in the Rocky Mountains.

The Absaroka and Darby overthrust belts limit the west side of the Green River structural basin. This province is characterized by several low-angle reverse faults, most of which trend in a general north-south direction. Stresses developed in the overriding thrust sheets have resulted in the formation of numerous elongate sharply folded anticlines, many of which are highly asymmetrical to overturned. The only production on these anticlines is at LaBarge and Big Piney—14 miles southeast of Mickelson Creek. And the LaBarge-Big Piney anticline is a front-row structure. Many more large complex anticlines lie to the west waiting for the drill.

Commands further attention. Up to 2 years ago most of Green River's drilling sights were set on the Big Piney-LaBarge structures on the west side, and on the Rock Springs uplift in the middle of the basin. Then last year all drilling interest swiftly shifted to the eastern part of the basin when Mesaverde Almond exploration tapped prolific oil sands at Arch and Patrick Draw units. Exploration in western and southwestern Wyoming has been sparse—hugging the Rock Springs, Rawlins, Church Buttes, and LaBarge structures. It wasn't until the Pinedale anticline discovery a few years ago that the possibilities of production on wayside anticlines in the vast basin were pointed up.

Mesaverde rocks have never produced much in the western half of Green River basin. Big Piney has some, but most of the field's output is from Wasatch and Almy Tertiary sands, and from the Hilliard of Upper Cretaceous age. LaBarge field has Wasatch, Hilliard, and Frontier Cretaceous production, while Pinedale on the brim of the Wind River Mountains on the rugged northeastern side of the dogleg part of the basin has Fort Union Tertiary gas.

If the No. 3 Mickelson Creek well comes in as a Mesaverde producer, Rocky Mountain exploration men may do well to look into this mountainous corner of their domain. The Mesaverde will be a hard sand to find. The drilling will be rough and the road long, but the Mesaverde oil and gas are there—the structures are there. Mickelson Creek is an important step forward.



Areas like this caused it to be called "Seward's Ice Box" at first, but is . . .

Alaska—the next big oil state?

Alaska offers a particular combination of circumstances that makes it one of the best places on earth to find oil. Here's what you should know about this state.

OUR FORTY-NINTH STATE has excellent geology, is more than twice as big as Texas, and more than one-third of its land area is considered potentially valuable for oil by the United States Geological Survey.

Out of a total of 375,000,000 acres of land, over 125,000,000 acres is in this category plus another 50,000,000 acres or so of its tidewater area. Many think that Alaska will one day be one of the four major oil provinces of the world, the other three being the Middle East, the Gulf of Mexico area, and the East Indies.

Alaska's possible petroleum provinces are scattered throughout the state. The northern-slope province is bigger than the State of Montana. The Cook Inlet area includes the Iniskin Peninsula, the Kenai Peninsula, the Susitna Valley near Anchorage, and the Copper River basin, and is an area larger than the entire oil-producing region of our fabulous Gulf Coast.

The above is a presentation to a group of Oil Security Analysts in New York given on May 19, 1960 by Theodore A. Zappa, president of Alaska Oil & Mineral Co., Inc., New York City.

Smaller basins are as large as the State of New Jersey.

Oil has been known to be in Alaska since 1853 when the first reports of oil seeps at Iniskin were reported by white traders. The first oil wells in Alaska were drilled at Oil Bay on the Iniskin from 1900 to 1904 and all four wells reported oil and gas with one reporting a 10-bbl.-a-day flow. These were drilled on or near oil seeps and none penetrated more than 1,000 ft. The scientific advancements made by geologists, geophysicists, drilling contractors, and equipment and service companies since 1900 would appear to almost guarantee successful wells in this same area today. It is expected that this area will be tested in the near future.

The major oil companies and some independents have sent geologists to Alaska since 1900 and some wells were drilled sporadically over the years. With the odds of 9 to 1 against finding oil in wildcat countries, it's no wonder that these few widely scattered attempts did not meet with success. Many wells found oil but not in commercial quantities. More serious efforts to find oil in Alaska required a change in the world oil picture. Alaska presented the problem of high exploration costs and initial drilling costs. Other areas were already producing and to extend these producing areas was relatively inexpensive. However, times have changed, and now Alaska offers much.

Its economic advantages. The crux of the oil picture today is not so much having the oil (the world has an overabundance of oil) but in having the

market. So the prime consideration in considering new oil areas is in analyzing the market potential. Alaska, of all producing areas, has the market for its oil.

The United States has about 16% of the free world's oil—or about 33 billion barrels reserve. The Middle East has about 65% of the free world's oil. However, the U. S. uses about 50% of the world's oil and thus is the prime market for oil in the world. To protect the domestic oil industry, the U. S. has found it necessary to restrict foreign oil coming into the country. This, then, is Alaska's first economic advantage over foreign oil.

Much of Alaska is government land and so most leases (99%) are federal oil and gas leases. This is the next important advantage over foreign oil. The profit-sharing ratio of the Middle East is changing from a 50-50 deal to a 75-25 arrangement with the oil companies getting the 25%. Venezuela is now on a ⅔-⅓ basis (⅓ to the oil company) and so the attraction of cheap foreign oil is diminishing.

Alaska offers favorable royalty terms with the government taking no more than a one-eighth royalty.

Political stability—safe investments. Alaska offers political stability. There

The author . . .

Theodore A. Zappa is president of Alaska Oil & Mineral Co., Inc. He attended Fordham University School of Business Administration. In 1946, he entered the family owned firm, A-Z Petroleum Industries of New York City, basically petroleum marketers. He became president of A-Z in 1950, and continued in that capacity until he organized Alaska Oil & Mineral Co. in 1955. He resigned from A-Z to become president of the new company. He is well qualified to discuss . . .

What does Alaska offer?

It has excellent geology . . .

Tremendous basins—125,000,000 acres of land area **plus** 50,000,000 acres of offshore area.

Richfield success—Swanson River unit and Soldotna unit—10 producers vs. 3 dry holes—"major" oil field.

Union success—major gas field on Kenai unit—20-year contract to city of Anchorage on three wells.

It has economic advantages . . .

. . . Over foreign oil

No import restrictions.

Favorable royalty terms.

Political stability—safe investments (no expropriation).

Immediate markets.

. . . Over domestic oil

Immediate markets—West Coast of United States.

Future markets—West Coast of Canada; Japan; all of Far East.

No production limitations, no proration as in Texas, Oklahoma, Louisiana, etc.

Oil may become cheaper than U. S. to find—U. S. cost $1 per bbl.; Alaska eventually may be down to 30 cents bbl.

Oil developments in Alaska so far . . .

Proof of Alaska's promise was Richfield's Swanson River discovery—July 1957—a major oil field.

Leasing increases from 6,000,000 to 40,000,000 acres in following year.

Lease bonuses jump from 50 cents an acre in 1957 to $500 per acre in some cases in 1959.

Richfield continues success—10 producers vs. 3 dry holes.

Standard of California announces pipeline to ship Swanson River and Soldotna unit oil—assumes minimum of 3,000 bbl. per day for at least 5 years.

Union Oil Co. major gas discovery on Kenai unit—20-year contract to Anchorage—looking for Fairbanks contract.

Union continues success—three producers out of three wells drilled.

"The crude already found in Alaska is of good, high-grade quality with from 30°-gravity crude on the Kenai to 49° gravity found at Iniskin."

is no danger that a foreign country's nationalism will one day lose the investments of our American companies.

Let's consider the market potential particularly. What markets would be available for Alaska crude? California is an oil state, but the gravity of its oil is low. Its average gravity is about 18°. Further, it's an asphalt-base oil. This makes good asphalt and plenty of it, but it doesn't make much good light components such as gasoline, fuel oil, jet fuel—the money makers for the oil companies.

So here we have an oil state which must import hundreds of thousands of barrels of higher-grade crude every day to supply its needs while its own wells are often capped or selling its low-grade crude at distress prices. The states of Washington and Oregon produce no crude and so also import hundreds of thousands of barrels of crude daily.

The crude already found in Alaska is of good, high-grade quality with from 30°-gravity crude on the Kenai to 49° gravity found at Iniskin. Surveys have indicated that crude can be shipped from southern Alaska (Anchorage and vicinity) to Seattle for about 40 cents per bbl. cheaper than can oil from any other producing area. Tanker transportation is so much cheaper than pipeline transportation that the nearby Canadian oil fields will not be able to compete. The Oil and Gas Journal of April 18, 1960 states: **"Alaskan crude has western Canadian producers worried.** Although this crude is not moving to market yet, it is generally expected that **some of the first customers will be refineries in Washington State.** At present, these plants are first rate markets for Alberta crude." The emphasis was made by the Journal. The market referred to is Seattle as Standard of California is moving some crude to San Francisco for its own account.

The survey further reveals that Alaska crude can be shipped to San Francisco and Los Angeles for 30 to 50 cents a barrel cheaper than any other crude including the Four Corners area (by pipeline). Thus our entire West Coast, which brings in hundreds of thousands of barrels of oil every day from near and far is actually a natural market for Alaska crude. Natural because of competitive shipping advantages and high-quality crude.

Future markets. Future markets may well include the Canadian west coast and of course there is crude-poor Japan. The Japanese have indicated they will take Alaskan crude once we have it to sell to them.

Our major oil-producing states in the U. S. certainly enjoy political stability as well as favored treatment over foreign oil. However, the big producing states proration the oil wells in order to share the production and the market among all producers, large and small. This limitation on production is caused by limited markets. In Alaska, we do not expect these limitations for quite some time. Actually, it is not expected until Alaska production attains several hundred thousand barrels a day or until it saturates the markets available to it. The new state needs income desperately to build roads, subsidize industry, and dozens of other uses. Since they have a one-eighth royalty on all production, oil promises to give the new state its money. It is expected that Alaska will push production rather than limit it. Thus the next advantage is no production limitations in the foreseeable future.

The next economic consideration is the cost of finding and producing oil. It is estimated that the cost of finding oil in the United States is approximately $1 per bbl. This cost is expected to increase as it is becoming harder to find new fields and more production is becoming of a secondary recovery nature. It has been estimated that the cost of finding oil in Alaska may decrease with greater activity until it may be 30 to 50 cents per bbl. eventually. While this does not approach the low Middle East cost of ½ cent a bbl., it certainly represents a great advantage over the U. S. cost and since our market here is protected, this great advantage over the U. S. cost is extremely important.

Oil Development in Alaska

With the advantages described so far, why has it taken so long to start serious development of Alaska's potential? Alaska had to **prove** that the promise of its excellent geology and large oil fields can be fulfilled. This appears to have been recently done. In July 1957, Richfield Oil Corp. made the first commercial discovery of the modern era in Alaska. The well it drilled on the Kenai Peninsula came in for 900 bbl. per day. Richfield admitted to a "major" oil discovery—"major" being interpreted in oil circles as a minimum of 100,000,000 bbl. of oil and no top limit.

Oil people went wild and oil leasing jumped in the year following the Richfield discovery from about six million acres under lease to over forty million acres leased or applied for. Standard of California immediately negotiated a contract with Richfield, whereby Standard agreed to spend $30 million in development and contribute 450,000 acres in the Kenai to a joint 50-50 partnership with Richfield if Richfield would share their 71,000-acre Swanson River unit plus another 80,000 acres or so held by Richfield on the Kenai. These facts then were proof that all Alaska needed was some fulfillment of its promise of being the great oil area it appears destined to be.

Oil bonuses jumped from 50 cents to about any price. When the federal Government put up some acreage in northern Alaska adjoining the Gubik gas field, the competitive bids went over $100 per acre for some of the land. When the State of Alaska put up 80,000 acres of offshore leases for competitive bid last December, it averaged $55 per acre for all the acreage with the highest bid up to $500 per acre paid by Union Oil for offshore leases neighboring its Kenai gas field.

The promise is more firmly confirmed by recent events. Richfield and Standard continued to drill the Swanson River with an amazing record of success so that by May 1960 they had seven hits, two dry holes, and were drilling three more wells. This in the face of world-wide odds of nine dry holes to one producer in wildcat areas. Standard's last producer in the Soldotna unit is the best of all, coming in for 1,870 bbl. per day. Standard has stated that this last discovery "confirms the oil-producing promise of Alaska."

Further, when Standard and Richfield began joint operations on the Kenai, Standard stated that when it was assured of at least 3,000 bbl. per day of sustained production over a minimum period of 5 years it would build a $4,000,000 pipeline from the Swanson River and Soldotna Creek fields to the shore of Cook Inlet, 22 miles away at Nikiski. During April 1960, Standard announced it is proceeding immediately to build the pipeline and expected to finish it mid-1961.

A rule of thumb used in the industry is that a company's gross realization is approximately $1,000 per **year** for each 1 bbl. of oil per **day** they ship. Thus 3,000 bbl. per day through that pipeline should gross Richfield and Standard approximately great potential is the Union Oil and $3,000,000 per year. This shows why the oil-finding costs may possibly approach 30 cents per bbl. in Alaska.

Further confirmation of Alaska's Ohio Oil's great gas discovery on the Kenai about 20 miles from the Swanson River unit. Near the town of Kenai on the coast of Kenai Peninsula, Union and Ohio completed a discovery gas well at an announced 31 M.M.c.f.d. of gas. Union is a conservative company, and yet this discovery was big enough for Union to immediately guarantee to supply the city of Anchorage, the neighboring city of Spenard and the two large military establishments near Anchorage with gas over the next 20 years. And this was before it drilled another well. Union drilled two more for 17 and 15 M.M.c.f.d. of gas, respectively, and found it unnecessary to prove up more gas as they already have more than the above cities need.

Union would also like to supply the city of Fairbanks and its major military installations with gas. At present, others intend to supply Fairbanks with gas from northern Alaska. Union could probably do it cheaper by pipelining the gas from Anchorage to Fairbanks along the Alaska Railroad right-of-way. It would also service the small communities along the way.

Further, at a recent AIME conference in Fairbanks, Union was quick to point out that cheap gas can make mining of metallics and nonmetallics competitive by taking the next logical steps—creation of local metallurgical refining and nonmetallics industries such as brick making and similar operations.

Union also speaks of the possibility of shipping liquid gas from Alaska which would require large investments for liquefying equipment near the gas fields in Alaska.

Union has not released any reserve figures for its gas field but it would appear logical to assume a major discovery, since Union talks and acts so confidently. The firm's good fortune, when coupled with Richfield's success, would appear to confirm Alaska's great promise of tremendous basins and eventually lower finding and producing costs.

Many major American oil companies, independents, and our Canadian neighbors hold leases, they are actively doing seismic and other exploration work, or are either drilling or holding development contracts requiring drilling soon.

New discoveries should be commonplace when Alaska has as many wells drilling in 1 year as Texas has in 1 day (40-50 wells completed every day in Texas). With big geology, big fields, big wells, no proration, and immediate markets, Alaska can be the oil man's paradise.

East Texas Jurassic Fields

Field—	County	Disc. company	Disc. year	Formation	Prod. depth* (ft.)	Type prod.	Wells
Eylau	Bowie	Barnsdall	1944	Smackover	7,664	Oil	1
Flower Acres	Bowie	Barnsdall	1946	Smackover	7,030	G-C	1
Ginger	Rains	Caraway	1951	Up. Jurassic	11,958	G-C	1
New Hope	Franklin	Tidewater	1953	Smackover	12,096	G-C	16
Mexia	Limestone	Humble	1955	Smackover	8,565	Oil	1
			1955	Smackover	8,536	G-C	1
Waskom-Bethany	Panola-Harrison	Crescent	1955	Cotton Valley	8,576	G-C	..
Powell	Navarro	Texaco	1957	Smackover	8,868	G-C	1
Sulphur Bluff	Hopkins	Grelling Est.	1958	Smackover	9,324	G-C	1
Bloomburg	Cass	Humble	1958	Smackover	10,380	G-C	1
Fruitvale	Van Zandt	Caraway	1958	Smackover	12,204	G-C	1
East Linden	Cass	Pan American	1959	Cotton Valley†	9,864	Oil ⌇	4
					10,254	Oil ⌇	
SE Fruitvale	Van Zandt	Caraway	1960	Cotton Valley	10,522	G-C	1
Bryans Mill	Cass	Shell	1960	Smackover	10,297	G-C	1
Tundra	Van Zandt	Pure-Texaco	1960	Cotton Valley	10,676	Oil	1
Unnamed	Delta	Best-Gibson	1960	Smackover	6,918	G-C	1
Unnamed	Cass	Gist-Pan Am.	1960	Cotton Valley†	10,981	G-C ⌇	1
				Smackover	11,125	G-C ⌇	
Unnamed	Wood	Pan American	1960	Smackover	12,765	G-C	1
Unnamed	Hunt	Paul C. Teas	1960	Smackover	8,970	G-C	1

*Discovery well pay top. †Dual completion.

Jurassic new East Texas target

EAST TEXAS' accelerated exploration of its elusive deep Jurassic oil and gas potentialities (OGJ, Aug. 15, 1960, p. 98) has accounted for the opening of its seventh new field to be found this year.

The new field is in southern Hunt County on the Mexia-Talco fault system at the northwestern rim of the East Texas embayment. Its discovery well, drilled by Paul C. Teas, is 4 miles northeast of Quinlan. It is a

July Multiple Completions

	Dual	Triple	Quadruple
Arkansas	1	..	..
Kansas	4	..	..
N. Louisiana	2	..	..
S. Louisiana	19	..	..
La. Offshore	2	2	..
Mississippi	3	..	..
W. New Mexico	1	..	..
Oklahoma	27	4	..
Texas	56	7	1
District 1	1	..	..
District 2	8	..	..
District 3	9	1	..
District 4	9	3	1
East	10	1	..
District 7-B	1	..	..
West	10	2	..
District 9	4	..	..
District 10	4	..	..
Total U. S.	**115**	**13**	**1**

200,000 Pounds Of Lifting Power In a 98 Pound Package

The 100 ton capacity Duff-Norton Aluminum Screw Jack weighs only 98 pounds. It is easier to handle and spot than any other type of jack of the same capacity which may weigh two to five times more.

Maintenance is virtually eliminated by the rugged construction—aluminum alloy housing and base—heat-treated steel lifting screw—sealed-in lifetime lubrication. This enables these jacks to withstand hard usage in any weather without damage.

The design of these jacks makes it impossible for them to creep—will support load indefinitely. They can be used in any position—have no fluid to leak—no air to lock. Duff-Norton Screw Jacks are ideal for heavy riggers or for construction and maintenance crews in shipyards, steel mills and other industries.

Duff-Norton Screw Jacks are available in 25, 35, 50 and 100 ton capacities in aluminum—in 15, 25, 35 and 50 ton capacities in malleable iron. For full details on these durable, all-purpose lifting jacks see your favorite supply store or write for Bulletin AD-12b.

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Ratchet • Screw
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Ratchet Lever • Air
Hand Chain • Electric

mile south of the Ashby-Ramsey area, productive from the much shallower Woodbine (Cretaceous) sand.

Location is more than 20 miles from the nearest other Jurassic field. Two other Jurassic wildcats are drilling in the county.

The well, 1 J. H. Chambliss, is productive of gas and condensate. Its pay zone is in the Smackover, lowermost member of the Jurassic. Pay is perforated at 8,970-9,048 ft. with hole having been drilled to 9,100 ft. Production in early tests was estimated at 3 M.M.c.f.d. of gas with condensate recovery at 30 bbl. per M.M.c.f.

Extent of East Texas' Jurassic development is shown on a special detailed color map just issued by Geo Map Co., Dallas. The new map, "Jurassic Drilling in Northeast Texas," is contoured (500-ft. intervals) on top of the Smackover. All wells which have penetrated the Jurassic are posted with total depths and subsea datum. Scale is approximately 1 inch to approximately 5 miles.

The seven discoveries this year make a total of 18 Jurassic fields which have been found so far in East Texas. They are listed in the accompanying tabulation at the top of the preceding page.

Triple-zone strike completed in Kansas

A triple-zone discovery is being completed in southwestern Kansas' prolific Eubank area, Haskell County. The discovery is Cities Service Oil Co. 1 Hall "U" in C W½ NE 5-29s-34w.

The well flowed 3,100 M.c.f.d. from a new pay for the field, the Toronto Pennsylvanian, at 4,032-38 ft. From Lansing "E" Pennsylvanian the well made 11,100 M.c.f.d. at 4,545-80 ft. Flow was 7,600 M.c.f.d. from Chester Mississippian plus 5 bbl. per hour.

Four wells slated for Alaska's Kenai

FOUR NEW WELLS are scheduled on Alaska's Kenai Peninsula, the only spot in the forty-ninth state that has come up with commercial production.

Three wells are planned by Union Oil Co. and Ohio Oil Co. in a development program mapped at Kenai unit gas field. All the wells will be a mile or more from the discovery.

The 23-4 Kenai unit will be located in 4-4n-11w, which is 2¼ miles east of the discovery. The 41-19 Kenai unit will be in 19-4n-11w, about 2¼ miles southeast of the discovery. The third well, 34-12 Kenai unit, will be about a mile southwest

JONES

FIRST IN 1894...

"Be it known that I, Samuel M. Jones, a citizen of the United States, residing at Toledo, Lucas County, Ohio, have invented certain new and useful Improvements in Couplings for Pipes or Rods, of which the following is a specification."

So reads the opening paragraph of Patent No. 528,168 granted October 30, 1894 . . . this was the beginning of JONES specialization...

FIRST TODAY...

Now, precision is the word for Jones co[illegible]d sub-couplings. Made in two finishes... "Soft" [illegible]d "Hardened and Ground", Jones couplings are finished and quality-controlled to API specifications. For the very finest in low cost oil recovery, continue to use Jones sucker rods and couplings... the products of recognized specialists.

...because we're Sucker Rod Specialists!

There are four JONES JOB-ENGINEERED SUCKER RODS... a type for every pumping need!

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You, too, can get dehydration at a profit . . .

DRY FRAC CONVERTS "EXPENSES" into PROFITS!

To most gas producers, the cost of dehydration is a necessary expense that is required to bring sales gas to pipeline specifications. There are many instances; however, where DRY FRAC can actually convert this expense into profits through initial or increased recovery of valuable hydrocarbons.

Here are four general situations where DRY FRAC can be used economically:

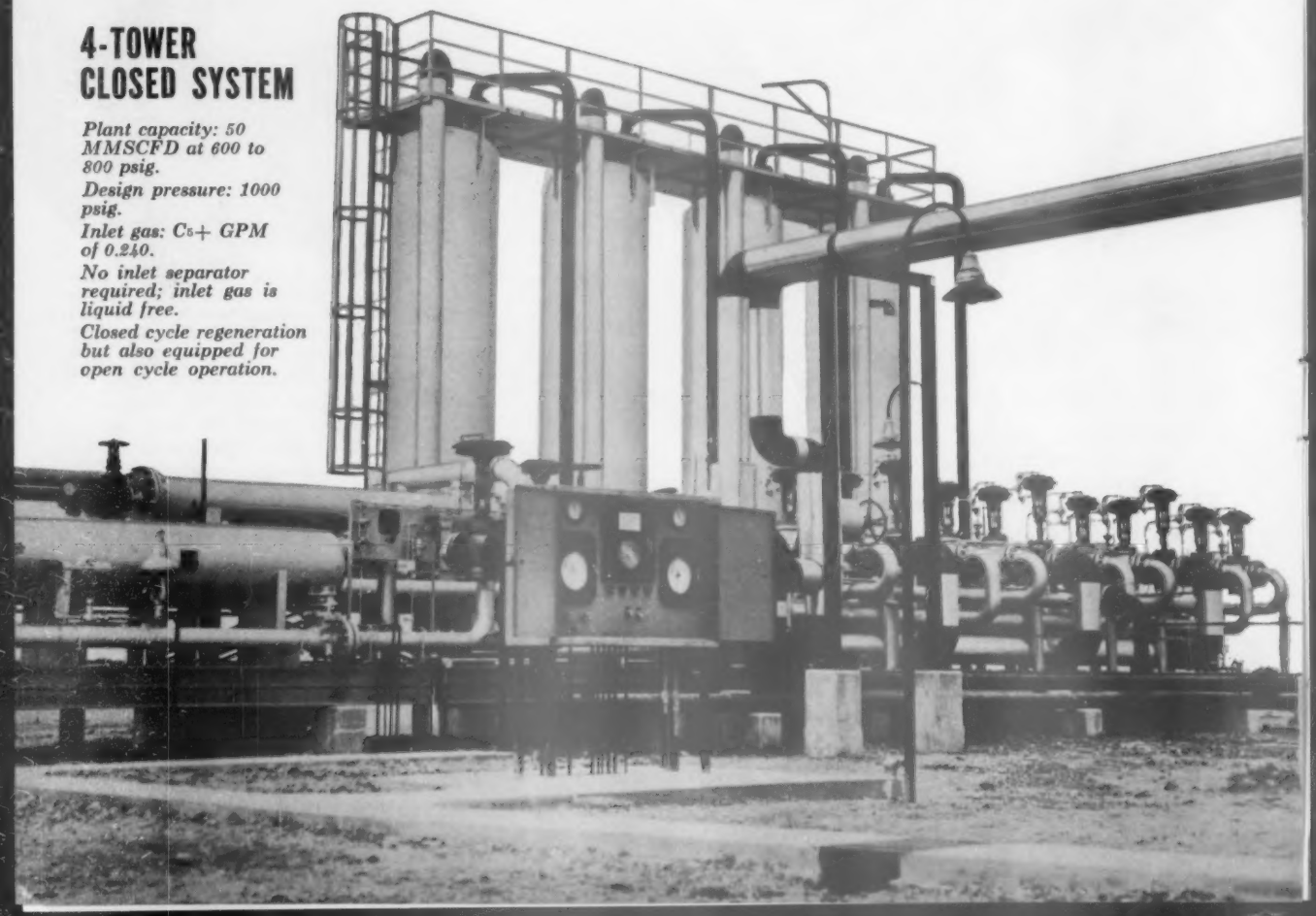
1. Where sufficient pressure drop is not available to operate conventional low temperature separation.
2. Downstream from conventional low temperature separation equipment where enough recoverable heavy fractions are still in the dehydrated gas to justify a DRY FRAC unit.
3. Where gas stream is too lean in heavy hydrocarbons to be processed economically by other means.
4. For dewpoint control where pipeline companies specify maximum hydrocarbon dewpoint as well as maximum water content.

Take another look at your gas production. You may not be realizing your full profit potential. With DRY FRAC you get dehydration to pipeline specification PLUS hydrocarbon recovery in one operation!

BS&B will give you accurate evaluation of wellstream potential and recommend the proper type and size of unit for maximum delivery and a quick payout!

4-TOWER CLOSED SYSTEM

Plant capacity: 50 MMSCFD at 600 to 800 psig.
Design pressure: 1000 psig.
Inlet gas: C_5+ GPM of 0.240.
No inlet separator required; inlet gas is liquid free.
Closed cycle regeneration but also equipped for open cycle operation.



3-TOWER OPEN SYSTEM

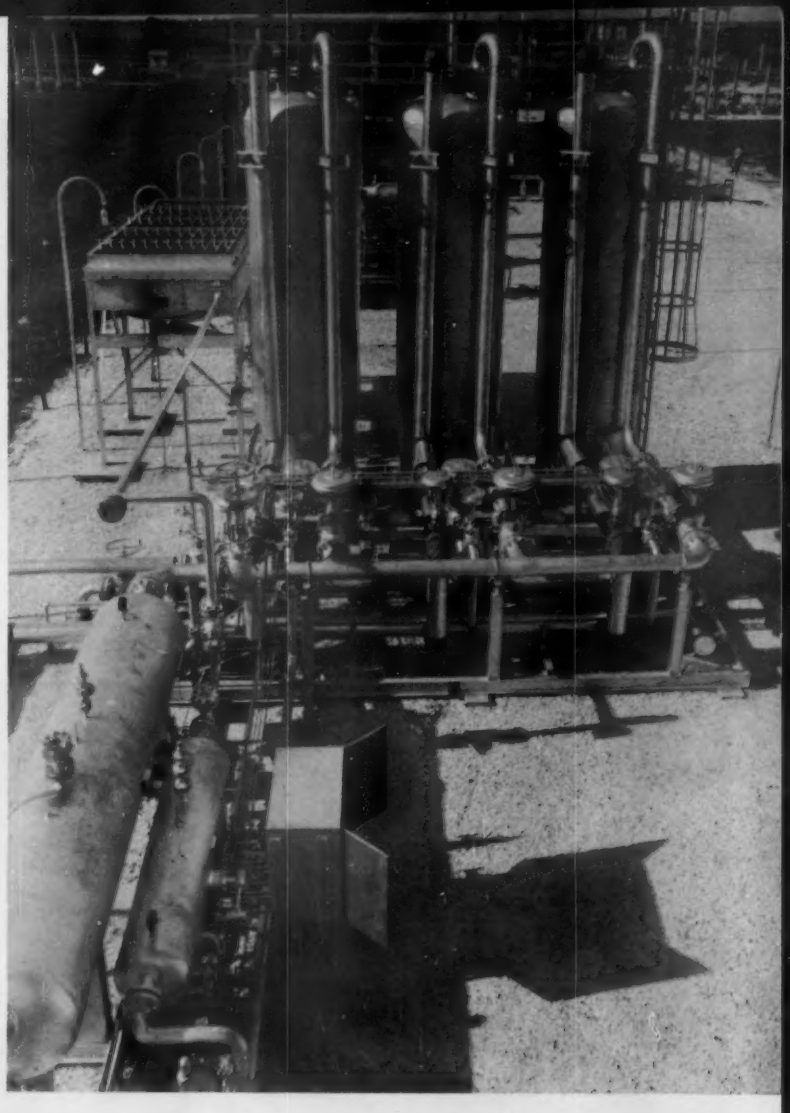
Plant capacity: 62 MMSCFD at 900 psig.
Design pressure: 1200 psig.
Inlet gas: C_5+ GPM of 0.067.
Open Cycle regeneration.

BASIC PROCESS OF DRY FRAC

DRY FRAC makes use of two or more dry desiccant beds to adsorb desired components from gas stream. When one bed becomes saturated, gas stream is switched through another bed. Saturated bed is then regenerated by passing heated gas through it to vaporize and drive off components which have been adsorbed on the desiccant. These components are condensed in heat exchange coolers and recovered from the regeneration gas stream.

Two types of regeneration systems may be used. In the "open" system, a side stream of gas from the main gas stream is forced through regeneration system to rejoin main stream ahead of inlet to the adsorbers. In the "closed" system, a trapped volume of gas is continuously recirculated through regeneration cycle by a blower.

DRY FRAC is basically similar to dry desiccant dehydrators except that drying and regeneration cycles have been shortened to utilize a greater weight of desiccant per unit volume of gas processed, while reducing size of adsorbers and total amount of desiccant required.



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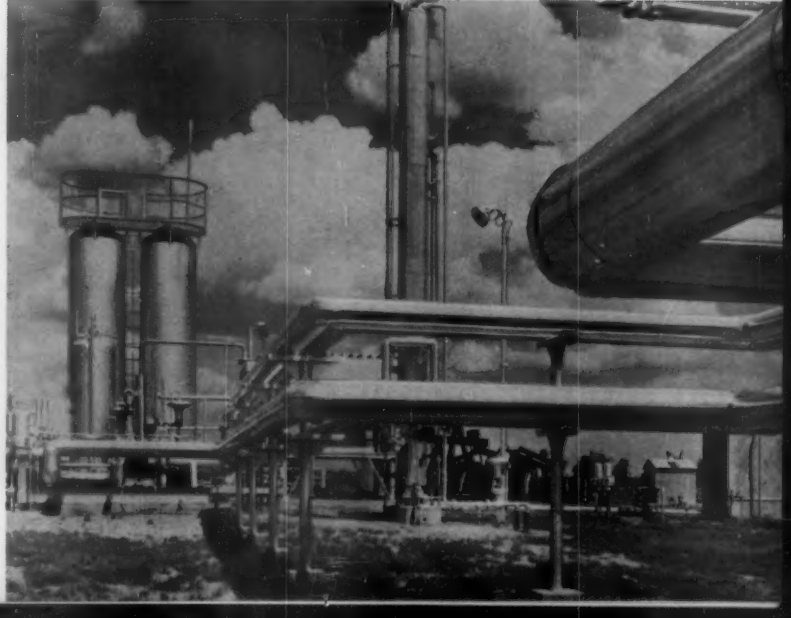
DRY FRAC is backed by BS&B's many years of engineering experience in all types of hydrocarbon recovery processes.



2-TOWER CLOSED SYSTEM

Plant capacity: 6.7 MMSCFD at 1000 psig.
Design pressure: 1200 psig.
Inlet gas: C_5+ GPM of 0.739, part of which is separated in inlet separator.
Closed cycle regeneration but also equipped for open cycle operation.

of the discovery in 12-4n-12w. Union and Ohio have completed three wells in the field.

A gas line is currently under construction moving production from the field about 65 miles northeast of Anchorage.

Soldotna Creek. Standard Oil Co. of California and Richfield Oil Corp. is preparing to move in equipment to drill the 12-9 Soldotna Creek unit in 9-7n-9w.

The new well will be about 1½ miles south of the Soldotna Creek discovery well, the 41-4. The discovery was completed in the Hemlock sand at 10,228-10,585 ft. at a rate of 1,870 bbl. per day through a ½-in. choke.

About a mile southwest of the discovery, Union and Ohio are testing the 14-4, which has been drilled to 11,520 ft. Operator has cemented 7-in. casing to 11,040 ft.

Coastal Drilling Co., Bakersfield, Calif., is contractor on both the Soldotna wells.

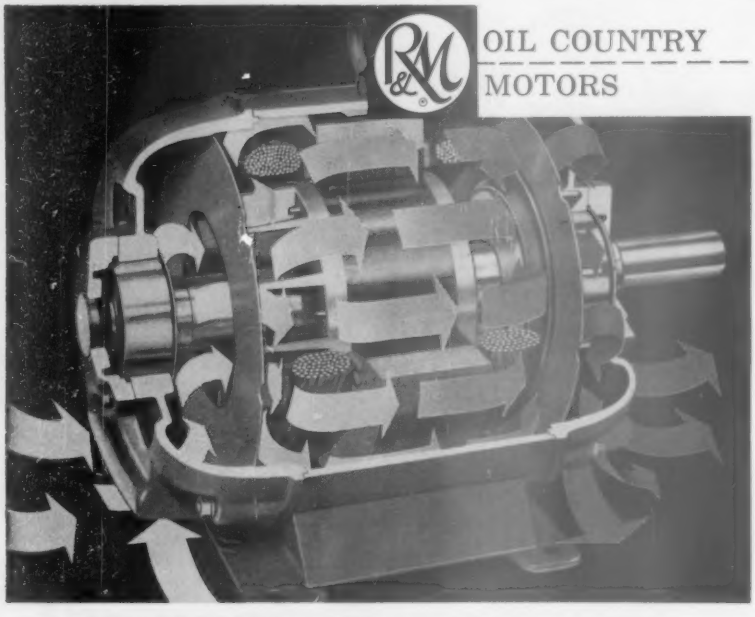
Cape Yakataga. Along the southern coast of Alaska and east of Kenai, Richfield is running logs on the 2 Kaliakh River unit.

This test is 2 miles north of a dry hole drilled on the unit earlier this year by Richfield. The well has been drilled to 8,001 ft.

Richfield is the sole operator on the Kaliakh acreage. The company has a development contract covering 571,121 acres in the area.

Swanson River. One other well on the Kenai has reached its projected depth.

Socal and Richfield have drilled the 32-33 Swanson River unit to 11,385 ft. and are preparing to run 7-in. casing. The 32-33 is ¾ mile north of Soldotna Creek production and ½ mile southwest of Swanson River production. The well is in 33-8n-9w.



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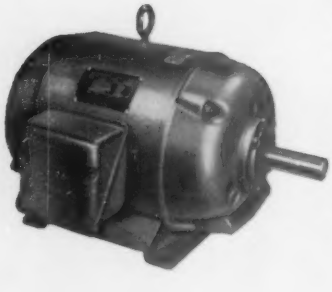
New Robbins & Myers "All Weather 40" Oil Country Motors



have a heat rise of only 40° C. with rodent screens installed, compared to 55° or higher for other makes of motors. A leading bearing manufacturer proved grease lasts 52% longer when rise drops from 55° to 40° C. Cooler performance by R&M motors means less maintenance, longer bearing life, longer service intervals. When you consider buying motors from 1 through 200 HP, remember that Robbins & Myers Oil Country motors give you these important maintenance savings. Write for Bulletin 520-OG

ROBBINS & MYERS, INC.
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Drillers look closer at Canadian sites

ALL of the major oil and gas accumulations in western Canada have not yet been discovered, and that's almost certain.

However, in recent months a trend towards closer scrutiny of certain regions of the West that were passed over in the hectic search for the really big field has developed. This trend is expected to continue and in fact gain some momentum. One excellent exaple of very rewarding results from the "reworking" of an area explored to a minor degree in the general rush of industry between 1950 and 1959 is the oil and gas development immediately north of Calgary.

The "Alley." This current hot spot in exploration and development of both oil and natural gas extends from the northeast corner of this city to the southern tip of the Harmattan-Elkton Mississippian oil and gas trend. The region that is blanketed by the 18-township rectangle extending 3 ranges west of the fifth meridian and from the southern limits of Township 25 north through Township 30 presently boasts 40 Cardium-sand oil completions, and 18 Mississippian gas wells. Immediately north of the area is the almost fully developed Harmattan-Elkton field and the area is flanked on the southeast corner by the quickly developing East Calgary wet-gas-producing area.

As recently as October 1959 this same area was one of only minor gas development and in addition to its 11 Mississippian gassers it also had 3 Cardium-sand oil wells. The oil wells were considered by many to be only marginal producers.

This area's current status on an important oil arena, with 40 Cardium-sand oil wells, and an area of considerable gas reserves, with 18 gassers,

is due in no small part to the efforts of a number of Canadian independent oil companies. Canadian Export Gas & Oil, Ltd., headed one of the independent groups that has sparked development of the Cardium oil sand in the area and Bailey Selburn Oil & Gas, Ltd., is operator of a second group of Canadian independents that have come up with considerable success.

Associated with CEOG in its operations have been Cree Oil of Canada, Provo Gas Producers, Ltd., and Alminex, Ltd., while Bailey Selburn's partners have been Canadian American Royalties, Ltd., Penwa Oils, Lt., and Conick Petroleums, Ltd. Other firms that have developments in the area include Shell Oil Co., Western Leaseholds, Inc., Home Oil Co., Ltd., Pan American Petroleum Corp., Fargo Oils, Ltd., Canadian Superior Oil of California, Ltd., French Petroleum Co. of Canada, Ltd., Scurry-Rainbow Oils, Ltd., Whitehall Canadian Oils, Ltd., Canadian Oil Companies, Ltd., Consolidated Mic Mac Oils, Ltd., Alcon Petroleums, Ltd., and Fraben Oil Corp.

Rigs busy. Twelve to fourteen rigs are active in the area and although a few dusters have been drilled in recent weeks the area should be a hot spot for a number of months.

Four wells in the region were in the news in the past week. Provo Gas Producers, Ltd., after coming up with a dud at its first operated test in the area, chalked up one of the best if not the best well in the Cardium string today. The company's dry hole was put down on LSD 8, 25-29-2w5, 29 miles north-northwest of Calgary and near the center of the main development area. The core barrel showed Cardium sand but there was no development in the zone. Second well for Provo, however, drilled just ½-mile west on its half-section farmout from Pan American Petroleum Corp. rights come into the Cardium at a most favorable elevation. The well found 16 ft. of net oil pay zone. This thickness just equaled the field's previous record pay section but on the basis of permeability and porosity a much better producer is indicated at the Provo 6-25 completion.

Bailey Selburn's group, a pioneer in both exploration and development in this area, recorded its tenth oil success at the Baysel-Can American 8-13-29-3 Westcott South producer. Flow rate was gaged at 5 bbl. per hour on recent production test.

The other newsworthy wells for Carstairs-Westcott field areas are both gassers. Pan American Petroleum figured in both tests. The first, a well

Short, compact, less to drill up

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Wire Line Bridge Plug

Small O.D. offers ease of running.

Can be set with any pressure setting tool.

The Type BC Otis Wire Line Bridge Plug is designed to take the guesswork out of plugging, yet it costs you no more than an ordinary plug. It's short and compact — less to drill up — and has an unusually small O.D. for ease of running. The Type BC has been successfully run on many occasions where other plugs failed to get down. And a feature you will particularly like is that the Type BC Otis Bridge Plug covers a wider range of casing weights than any other plug available today. This feature alone has saved many times the cost of a plug where accurate casing weight records were not available.

AVAILABLE FROM ALL ELECTRIC LINE SERVICE COMPANIES — STOCKED AT 247 FIELD LOCATIONS. Not only are Otis Wire Line Bridge Plugs available through any electric line service company, but stocks are maintained at 247 different field storage locations so that you can set an Otis plug whenever you need it — wherever you need it. And Otis bridge plugs can be set on any type of pressure setting tool. So the next time you need a bridge plug to prevent movement of fluid or gas from either direction in the casing, or to plug and abandon — play it safe — specify an Otis Wire Line Bridge Plug.

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actually operated by Pan American and a test on Fargo Oils, Ltd., farmout lands, flowed gas at the rate of 11 M.M.c.f.d. on Mississippian zone drill-stem test. This success, Pan American Fargo 11-13-28-2 Mose, lying outside the defined field limits of the Crossfield gas field is 20 miles north of Calgary.

Alcon Petroleums, Ltd., drilling on a Pan American farmout just north of Crossfield gas field, 24 miles north of Calgary, flowed wet gas at 3 M.M.c.f.d. also from the Mississippian. This venture was not tested in the Cardium-sand section but on basis of core recovery it indicated about 10 ft. of effective oil pay zone. The Alcon test is 1 mile north and that same distance east of previous Cardium-sand oil completions.

Although the Cardium-sand oil play currently accounts for the major part of the activity in this area the gas discoveries will be followed up with renewed vigor as soon as gas export gets under way on a large scale from the western section of Alberta. Meanwhile, "Cardium Alley" just north and northwest of Calgary has become a concrete example of what can happen when a much closer look is afforded a particular area in the oil prospecting country. Small, almost minute, areas such as this, in the vast sedimentary basins of western Canada can and will come up with considerable oil and gas reserves.

Action stirs in Illinois' Richland

A busy new area in the Illinois basin is located 1 mile west of Olney in Richland County, Illinois.

D. T. Drilling Co. 1 Getz in NE NE NE 32-4n-10e swabbed and flowed 900 bbl. of oil in the first 24-hour period from Rosiclare at 2,980-87 ft. This opens a new producing sand in the area. The 1 Clodfelter Heirs in SE SE SE 29-4n-10 recovered 2,680 ft. of clean oil and 30 ft. mud-mixed oil on tests in the Rosiclare.

J. T. Speake Drilling Co. et al. 1 Vernon Wilson in SE NW NE 32-4n-10e is also a Rosiclare find. This well had 2,350 ft. of clean oil on drill-stem test recovery. These wells are the development followup to the June discovery at Black & Black Oil Co. 1 E. J. Wilson in SE SE NE 32-4n-10e. That well pumped 91 bbl. of oil per day from Aux Vases at 2,918-38 ft.

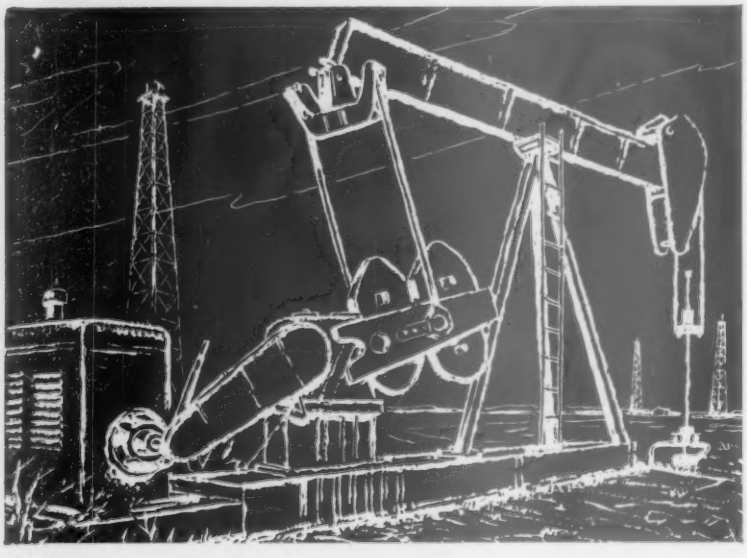
Illinois adds small gas pool

One small new gas pool, Marissa West in St. Clair County, was discovered in Illinois in July.

Also listed were six oil-well extensions and one gas-well extension to pools, as follows: one oil well each to Iuka pool in Marion County, Olney Consolidated pool in Richland County, Passport South pool in Richland County, Keenville pool in Wayne County, and Roland Consolidated and Sumpter East pools in White County, and one gas-well extension to Marissa West pool in St. Clair County.

A total of 204 wells was completed in July, an average of 41 a week for the 5-week period. The July completions include 88 oil wells and 1 gas well, a success ratio of 44%. In addition, seven wells that had previously been completed as dry holes were worked over and recompleted, five as oil wells and two as gas wells.

Two of the July completions were drilled deeper than 5,000 ft. Texaco Inc. 9 M. E. Heaton well in 17-3s-7e, Wayne County, were drilled to a total depth of 5,385 ft. It was plugged back to 3,240 ft. and completed as an oil producer from the Aux Vases sandstone. The 10 Heaton well in the same section, also drilled by Texaco Inc., was drilled to a total depth of 5,368 ft. and completed as an oil well producing from the Dutch Creek sandstone and the Harrodsburg limestone.



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In addition, Nation Oil Co. deepened the 2 W. P. McIntosh well, 31-3s-8e, White County, to 5,455 ft., plugged it back, and completed it as an oil well in the St. Louis limestone at 3,546 ft. It had originally been drilled in 1959 to 4,191 ft. and completed as an oil well in the Harrodsburg limestone.

Estimated production for Illinois for July is 6,663,000 bbl.

Big Michigan drilling program set this month

First drilling action in northern Michigan following a big land play earlier in the year is due to start before the end of August.

McClure Oil Co. plans a three-well program on Beaver Island, part of Charlevoix County, and about 30 miles offshore from the mainland.

National Associated Petroleum Co. will drill three tests, possibly more, in Leelanau, Antrim, and Presque Ile counties. Niagaran and Trenton sections will be tested.

Albion. Fulk Oil Co. abandoned 1 Palmer, SE SE SW 2-1n-6w, Eaton County, one of four recent wildcat starts from 10 to 15 miles northwest of drilled production on the Albion-Scipio trend. Fulk abandoned at 5,247 ft. after logging Trenton at 4,553 ft. and Black River shale at 4,926 ft.

Well completed in Ohio's Licking

In Ohio, Waverly Oil Works announced a 100-bbl. producer was completed south of Reform Berea pool in Perry Township, Licking County.

The stepout, 3 Florence Levy, Section 24, found the Clinton sand at 2,812-38 ft. and 2,849-66 ft. with 280 ft. of oil natural.

In northeastern Monroe Township, Holmes County, Dave Cantway sunk a Clinton test about 1,200 ft. west of two abandoned producers on the E. McGovern tract in Lot 18. The pay was found at 3,344-76 ft. and tested 2,890 M.c.f.d. with 1,100 psi. after fracture.

Third completion for Berlin field, Michigan

In Michigan, Sunray Mid-Continent Oil Co. has completed the third oiler in the Berlin field, St. Clair County.

The firm's 2 Berk-Henderson, C NE SE 32-6n-13e, flowed 133 bbl. of oil a day through ⅜-in. choke from perforations at 3,755-3,822 ft. opposite the Niagaran reef formation.

Operator Drills 170% More Footage, Increases Bit Life 66% With Seeco-Mul

Inherent Lubricating Qualities Also Broaden Use of Seeco-Mul As Effective E-P Additive

A division drilling engineer for a major in West Texas reported these significant figures after completing an 11,500′ well with a Seeco-Mul mud. Oil-and-water emulsion drilling fluids are being used extensively by the division, and detailed records were maintained on both field and exploratory wells drilled with company rigs. Here's what Seeco-Mul did:

- *Increased bit life 66%.*
- *Increased footage per bit 170%.*
- *Increased penetration rate 66%.*
- *Saved $9,000 in one interval.*

Not only did they get the benefit of the extreme-pressure properties in Seeco-Mul, which extended bit life, but also attributed to the Seeco-Mul system were "a more nearly gauge hole, fewer round trips, less wear on the rig and equipment, more rig time in actual drilling, and less wear on pumps, liners, and the drill string."

On another test, "the average rate increased 45% and the footage-per-bit increased 86% in a single 800′ interval. Ten fewer bits were used, and 122 less rig hours, for an estimated savings of $7,500."

And here's what the company said about $2,540 spent for a product *specifically sold for bit lubrication:* "No increase in bit bearing life or penetration rate was achieved . . . on the basis of the test results (higher drilling costs with no improvement in bit life), further use was discontinued until more favorable results could be anticipated to justify the added expense."

Seeco-Mul, often run in so-called soap drilling fluids to lower the surface tension, is a chemical additive with superior wetting abilities. In addition, Seeco-Mul is an efficient E-P agent. It deposits an extremely tough lubricating film that will withstand high pressure and successfully reduce metal-to-metal contact of the bearing surfaces in the bit.

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Well No.	H-4	D-2
Type Mud	Seeco-Mul CMC low solids	CMC low solids
Interval	9,999-10,787	9,999-10,803
Footag.	788	804
Bits	8	22
Rotary Hours	126	210
Rotary and Trip Hours	174	342
Weight	35	25
RPM	38 to 50	60
Feet Per Hour	6.3	3.8
Feet Per Bit	98.5	36.5
Hours Per Bit	15.8	9.5
Penetration Rate Increase	65.8%	—
Footage Per Bit Increase	169.9%	—
Cost Per Foot*	$11.20	$22.54
Mud Cost (including mud-up)	$1,470.00	$1,150.00

*Total rig time × $45 per hour + number of bits × $124.30 ÷ interval footage.

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Total depth was 3,896 ft. with 5½-in. casing cemented at 3,895 ft.

The well is a southwest diagonal offset to the firm's discovery well, the 1 Bollaert, completed in February for a flow of 200 bbl. of oil per day. Sunray completed a confirmation well in May at the 1 Berk-Henderson, NE NE SE 32-6n-13e, flowing 200 bbl. of oil a day.

Berlin field is located about 1 mile south of Allenton, Mich., and 40 miles north of Detroit. Sunray owns about 2,500 acres in the immediate vicinity of the field. Nearest proven production is 15 miles to the northwest.

Oklahoma action is widespread

EXPLORATORY HAPPENINGS in Oklahoma were widespread last week with every corner of the state being heard from.

In Canadian County, Cities Service Oil Co. opened a new Cottage Grove Pennsylvanian oil pool at the 1 Fitzgerald in C SW NE 6-12n-8w. This is the second well in Fort Reno gas field, a two-zone Ordovician discovery of several months ago. The new well is 1 mile west of the field discovery and 12 miles west of nearest oil production at West Edmond. The well flowed 162 bbl. of 40°-gravity oil in 18 hours through ½-in. choke from perforations at 8,235-39 ft.

New Hope. At Southeast New Hope field in Garvin County, southern Oklahoma, Cities Service 1 Brown-K, C SW NE 16-4n-3w, will be a triple-zone discovery. From Oil Creek Ordovician sand at 9,714-58 ft. the well flowed 5,542 M.c.f.d. and 63 bbl. condensate in 6 hours. Open flow was 14.140 M.c.f.d. From third Bromide Ordovician at 9,266-9,345 ft. the well flowed 75 bbl. of oil in 6 hours through 15/64-in. choke and 1,856 M.c.f.d. The McLish at 9,402-35 ft. was good for 270 bbl. condensate per day through 15/64-in. choke and 3,056 M.c.f.d.

McClain. A dual discovery is reported by Brooks Hall and Gordon Street at 1 Allison in C NW SW 8-7n-4w, northwest of North Dibble field in McClain County, South Central Oklahoma.

The well flowed 62 bbl. of oil per day through 14/64-in. choke from Hart sand at 9,410-16 and 9,530-42 ft. From Osborne sand at 9,810-9,908 ft. the well flowed 86 bbl. daily through same choke.

Woods County. Northwest Avard field in northwestern Oklahoma was

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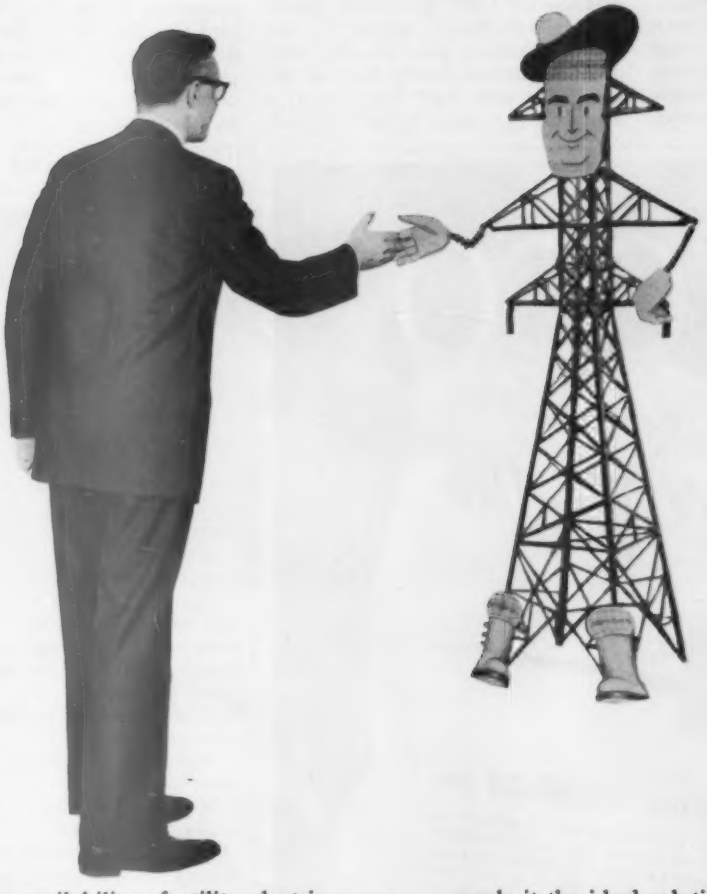

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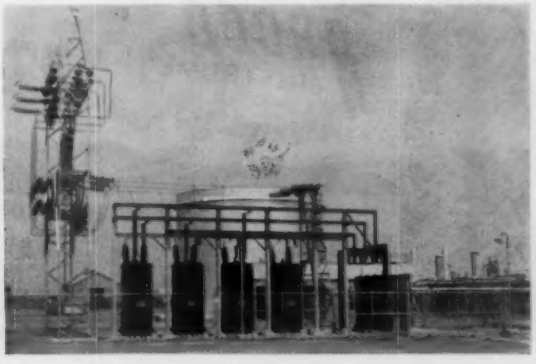

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extended north at Shell Oil Co. 1 Oshel, C NE SW 30-27n-15w. Open flow in Tonkawa at 4,858-4,904 ft. was 6,400 M.c.f.d. plus 26 bbl. condensate per million.

Boone Mountain sets Pennsylvania pace

BOONE MOUNTAIN pool in Punxsutawney-Driftwood field, Pennsylvania, continues the most active area in the state. Of the four completions last month, three were producers from the Onondaga-Oriskany interval. Two of the gas wells had open flows after fracture of 15 M.M.c.f.d. Both of these are on the Green Glen property, operated by Felmont Oil Corp.

At Rockton pool in the same field, there were two new gassers. The largest was New York State Natural Gas Co.'s Manges well. It had an open flow of 6,698 M.c.f.d. at a rock pressure of 3,575 psi. in 45 hours. A 4-mile-southwest stepout to the Boone Mountain pool was the only dry hole drilled during July in the area. The well, R&P Coal Co. 1, a Sam Jack operation, found four shallow gas pays amounting to a total of 323 M.c.f.d. between 1,110 ft. and 2,955 ft. The well was dry in the Onondaga-Oriskany interval, and was later plugged and abandoned.

Erie County. Two Medina gas producers were completed in this northwestern Pennsylvanian county in Conneaut field. A third well was also completed in this field, but in Crawford County. It was dry in the Medina. This area lies east of the big play in Ashtabula County, Ohio—a development that has been going on for about 2 years.

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Johnstown. A stepout in Johnstown field found salt water in the top of the Oriskany sand and was abandoned.

The Hillbish wildcat in Northumberland County is slowly drilling ahead at 3,992 ft. with the Oriskany as its target.

The Venango County deep test on the Burkhardt farm is shut down at 2,623 ft. An oil show was found at 1,745 ft.

Benedum-Trees' wildcat in Washington County reached a total depth of 6,575 ft. This well is supposed to have bottomed in the Helderberg with an open flow of gas of 1 M.M.c.f.d. This information has not been confirmed by the operator, and it is a tight hole.

The joint Peoples Natural Gas Co. and Snee-Eberly wildcat on the east flank of the Chestnut Ridge anticline found 140 M.c.f.d. in the Onondaga chert at 7,609 ft. This is the Earl Rahl well in Fayette County. Operations have been shut down at 8,022 ft.

A York County wildcat by Wrightstone and Shearer which has been shut down for several months after drilling through more than 1,000 ft. of diabase, has resumed drilling and is drilling in red sands and shales at 1,440 ft. Projected depth is 3,000 ft.

Discovery Wells

WESTERN CANADA

Alberta:

Mobil 10-20 Peers, LSD 10, 20-53-12w5. Cardium sand oil discovery. TD 4,990 ft.

Baysel-Canadian American et al. 8-13 South Westcott, LSD 8, 13-29-3w5. Cardium oil discovery. TD 6,696 ft.

Cancrude-Michigan Wisconsin 10-11 Hilda, LSD 10, 11-19-1w4. Medicine Hat gas discovery. TD 2,605 ft.

Samedan Crown 10-1 Oyen, LSD 10, 1-29-6w4. Viking gas discovery. TD 3,200 ft.

Triad 6-20 Brown Creek, LSD 6, 20-44-17w4. Mississippian gas discovery. TD 14,242 ft.

Dome-Provost 6-26 Ward Lake, LSD 6, 26-66-18w4. Glauconitic gas discovery. TD 1,978 ft.

CALIFORNIA

Sacramento County:

Amerada Petroleum Corp. 1 Garin Gas unit, Sec. 29-5n-4e, gas flow (no estimate) from perforations at 4,672-77 ft.,

TD 6,475 ft. (New field discovery at Grand Island field 3 miles northwest of Walnut Grove field.)

COLORADO

Rio Blanco County, West Douglas area:
Beardmore Drilling Co. 18-3 Government, SW SE 18-2s-102w. IP shut in gas well, Emery 2,630-2,908 ft. TD 2,908 ft. Emery discovery, new field.

NEBRASKA

Banner County:
Ambassador Oil Co. 1 Snyder, C NW NE 17-18n-55w. IPP 110 BOPD, cut 15% water, "J" sand discovery, new field. TD 6,130 ft.

Morrill County:
British-American Oil Producing Co. 1 Nebraska-H, C NE SW 16-17n-52w. IPP 262 BOPD, "J" sand discovery, new field. TD 5,323 ft.

NEW MEXICO

Rio Arriba County:
Compaxx Exploration Co. 1-7 Federal, SE SE 7-24n-7w. IPF 2,485 M.c.f.d., Dakota 7,186-7,266 ft., Dakota discovery, new pool. TD 7,331 ft.

WEST TEXAS

Reagon County:
Kewanee Oil Co. 1 Stiles, 6 miles southwest of Stiles in Sec. 1209, Block C, D&SE Sur. IPCAOF 22 M.M.c.f.d., plus 952 bbl. condensate per day, 58.6°, Eusselman 10,373-10,382 ft.; Ellenburger open hole made 4,300 M.c.f.d. plus 349 bbl. condensate per day, 58.3°, 10,441-10,557 ft. TD 10,557 ft. Dual gas discovery.

Winkler County:
Emperor field. Continental Oil Co. 2 Brown-Altman unit, 5 miles south of Kermit in Sec. 25, Blk. B-5, PSL Sur. IPCAOF 18,300 M.c.f.d., Wolfcamp 7,255-92 ft. TD 7,450 ft. PBTD 7,330 ft. New gas discovery.

WYOMING

Campbell County, O'Connor:
Davis Oil Co. 1 O'Connor, C NE SE 30-52n-69w. IPP 295 BOPD, Muddy 5,975-89 6,005-14 ft. TD 6,341 ft. Muddy discovery, new field.

Converse County, Brenning Basin:
Samedan Corp. 1 Government, OWDD, NE NW 26-34n-73w. IPF 80 BOPD, 9/64-in. choke, TP 150 psi., 39°, GOR 355:1, Beaver Creek 11,886-11,910 ft. TD 12,658 ft. Beaver Creek discovery, new field.

Crook County:
Skelly Oil Co. 1 F. S. Guthery, C SW SE 34-52n-68w. IPP 38 BO, 24 BWPD, Minnelusa discovery, new field. TD 7,056 ft.

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NEW MEXICO

Chaves County:

Texaco Inc. 1 Federal-Key, 13 miles north of Maljamar in 17-15s-30e. IPP 16 BOPD, 60°, 10 BWPD, GOR 2,250:1, Devonian 11,204-5 ft. TD 12,158 ft. New oil discovery.

Lea County:

Austral Oil Co. 1 State, 1½ miles northeast of Caprock in 33-10s-32e. IPP 49 BOPD, plus 4 BWPD, 46.6°, Pennsylvanian 10,178-88 ft. TD 11,344 ft. New oil discovery.

Cactus Drilling Co. 1-B Catron-State, 11 miles northwest of Monument in 11-18s-36e. IPCAOF 825 M.c.f.d., Queen sand 4,476-86 and 4,640-50 ft. TD 5,213 ft. New gas discovery.

Pennsylvania Shallow-Well Completion Statistics for Second Quarter, 1960

County—	Total	Oil	Gas	Dry	Input	Footage	D.D.	D.D. Footage
Armstrong	11	0	9	2	0	33,537	3	4,005
Clarion	14	0	12	2	0	33,519	0	0
Fayette	1	0	1	0	0	3,535	0	0
Forest	4	0	0	4	0	4,406	0	0
Indiana	3	0	3	0	0	8,704	1	2,143
Jefferson	5	0	5	0	0	14,370	0	0
McKean	136	70	0	1	65	251,895	4	675
Potter	1	0	0	1	0	2,250	0	0
Tioga	1	0	0	1	0	1,385	0	0
Venango	5	3	0	0	2	4,731	0	0
Warren	1	1	0	0	0	757	0	0
Washington	3	2	1	0	0	7,038	0	0
Westmoreland	8	0	7	1	0	25,672	0	0
Total	193	76	38	12	67	391,799	8	6,823

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J-228

Gulf Coast geologists to meet

The tenth annual meeting of the Gulf Coast Association of Geological Societies is to be held jointly with the Gulf Coast section of the SEPM at the Buena Vista Hotel in Biloxi, Miss., October 19, 20, and 21, 1960.

This year the Mississippi Geological Society of Jackson, Miss. is the host for the convention, with A. E. Blanton, Sun Oil Co., as the general chairman. The meeting has been designated as the regional fall meeting by the AAPG. Approximately 1,200 geologists from throughout the Gulf Coast area are expected to attend, representing the 11 member geological societies of Beaumont, Corpus Christi, Houston, San Antonio, and Tyler, Tex.; Lafayette, Lake Charles, New Orleans and Shreveport, La.; Jackson, Miss.; and Tallahassee, Fla. Association officers include: president, M. F. Kirby, Jackson, Miss.; vice president, D. N. Osburne, New Orleans; secretary, W. W. Woolfolk, San Antonio; and treasurer, E. G. Jeffreys, Jackson.

The theme of the convention will be, "The Future of Gulf Coast Oil," and the keynote address regarding this subject will be delivered by Dr. Frank Gardner, The Oil and Gas Journal, Tulsa. Other major addresses will be presented by P. D. Burland, Monsanto Chemical Corp., Houston; E. B. Miller, Tidewater Oil Co., Houston; and John Winger, Chase Manhattan Bank, New York City.

New well slated for Kentucky's Caldwell

A local oil drilling firm announced that preparations are being made for a new wildcat in Caldwell County, Kentucky.

Mo Jo Oil Co., Inc. reports that C. D. Ezell Drilling Co. will be contractor on the new O'Hara lime test on the C. R. Stallins tract.

Wynn Says Chemicals Bright Spot for Oil

• New Sunray Chemical boss plans to stress research, marketing.

IN 1907, the year Indian Territory became Oklahoma, Glenn E. Wynn was a 5-year-old tyke who lived with his family in Tulsa just south of town. He spent endless hours in those days playing in the vacant field across the road.

Today, across the same road (it's now Detroit Avenue) stands the Sunray building where Wynn spends his time as president of the newly created Sunray Chemical Co.

The jump from son of a Tulsa feed store merchant to president of the new Sunray company, even though it was just across the street, was no simple one. Most of that time was spent learning, practicing, innovating, and manipulating refinery-processing methods.

After attending Tulsa's Central high school, Wynn moved with his family to Lawrence, Kans., where he later attended Kansas University. He finished his college education in 1923 and in 1924 joined Mid-Continent Petroleum Corp. as a test engineer at the Tulsa refinery. Process engineering became his long suit.

Steady rise . . . Looking back, Wynn's rise at the Tulsa plant seems automatic.

Next he became process engineer, then in succession chief process engineer, assistant refinery superintendent, superintendent of the plant. In 1949 he was named vice-president of manufacturing for Mid-Continent Petroleum; and when Mid-Continent merged with Sunray in 1955, he was named vice-president of DX Sunray. By then, Wynn was known throughout the industry as a process engineer deluxe.

Sunray's Glenn E. Wynn . . . He used to play across the street.

It was 1958 when he became president of 4-year-old Suntide Refining Co. of Corpus Christi, Tex., which consisted of a rather sparsely towered plant on Nueces Bay. At the time, Suntide was an affiliate of the Sunray organization.

Since then, it has become a subsidiary of Sunray Mid-Continent Oil Co. and has sprouted multimillion-dollar units including a Udex benzene extraction plant, a delayed coking unit, ortho-xylene facilities and expanded storage capacities. Under construction now are hydrodealkylation and styrene units, and nearing completion is an ocean-going ship channel connecting the plant with Corpus Christi Bay.

This month Wynn was named president of the new Sunray Chemical Co., a firm which plans to research, manufacture, and sell petrochemicals.

Bright spot . . . Wynn thinks the future of petrochemicals, brought about primarily by competition, is the bright spot of the oil industry.

"When supply exceeds demand," Wynn says, "it breeds tough competition; and competition, in turn, taxes the ingenuity and resourcefulness of every company. Petrochemicals is one of the obvious fruits of competition and as a result, the companies that have money to invest and people who can produce will win the battle. It's good for this company and the industry as a whole and it's certainly going to benefit the customer in the long run."

As his first step as head of the new firm, Wynn plans to seek out new markets and expand research. "The industry has just scratched the surface, so there's a great deal of work to be done."

Wynn looks the part of an executive but when he talks about petrochemicals, he exudes the excitement of a 5-year-old boy who's about to run across the road to play in a big vacant field.

▶▶▶ Personals

Charles F. Hedges has been named manager of crude-oil purchases for Western Crude Marketers, Inc., a division of Dakamont Exploration Corp. He will continue to headquarter in Denver.

Dr. Adalbert Farkas, assistant director of research for Houdry Process Corp., has been elected president of the International Congress on Catalysis, Inc. The organization will sponsor the third catalysis congress in 1964 in Holland. Second congress was held recently in Paris.

Dr. Richard C. Weart has been named head staff geologist for Sun Oil Co.'s foreign operations department in Philadelphia. He succeeds the late Herbert J. Weeks. **Thomas F. Ritter** has been appointed assistant head staff geologist. Weart has been on special assignment in Paris since February. He previously had been assistant chief geologist for Sun's Latin American division and research geologist in Caracas, Venezuela. Ritter moved to Philadelphia earlier this year after an assignment in Bolivia.

J. M. (Jim) Henagan has joined Lion Oil Co. division of Monsanto Chemical Co. as a senior petroleum engineer. He will headquarter in Houston.

Personals

Spence T. Taylor, executive vice president of Mobil Oil de Venezuela, has been named to succeed **Dr. James A. Tong** as president of the company. The appointment is effective September 1. Tong will continue in an advisory capacity until his retirement January 1. Taylor was exploration manager of the Venezuelan company before being named executive vice president last year. Tong was general manager of Mobil's Colombian affiliate before becoming president of Mobil de Venezuela in 1948.

TAYLOR

Lisle W. Sweet, Pure Oil Co. vice president for marketing, will retire September 1 after 27 years with the company. Sweet was elected vice president, retail marketing, in 1952, and vice president, marketing, in 1958.

Ernest W. Boyer has been promoted to senior research chemist in Continental Oil Co.'s research and development department. He will supervise the mass spectrometry group, analytical research section.

J. Q. Snell, assistant division landman for Tidewater Oil Co. in Houston, has been transferred to Bakersfield, Calif., as district exploration manager. **Jim Mercier,** Bakersfield, has been transferred to Las Palmas, Canary Islands, as district geophysicist. **Lou Villanueva,** geologist, also has been transferred to Las Palmas from Bakersfield. **Cliff Church,** division paleontologist for Tidewater, and **Bill Cortright,** senior geologist, have retired.

S. D. Breitweiser, president of DX Sunray Oil Co., has been elected president of Suntide Refining Co., succeeding **Glenn E. Wynn.** Breitweiser will continue as DX Sunray president. Wynn was recently elected president of the new Sunray Chemical Co. (see page 145 and OGJ, Aug. 15, p. 105). **Harry A. Brown** has been named senior vice president of Suntide Refining. He will continue as manufacturing vice president for DX Sunray. **Walter E. Biery,** president of Mid-Continent Pipe Line Co., will also be president of Suntide Pipe Line Co. He succeeds Wynn in this post. **T. E. Fitzgerald** has resigned as a director of Suntide Refining to become a consultant to Sunray Chemical.

John L. Holder, assistant superintendent of New York State Natural Gas Corp.'s Mamont district, Murrysville, Pa., has been named district superintendent. **Wilbur J. Whitehill,** chief engineer for stations in the district, will succeed Holder as assistant superintendent.

Bryan C. Edwards, assistant manager of gas sales for Pan American Petroleum Corp., has been elected president of Pan American Gas Co., a subsidiary. He succeeds **Gilbert F. Moore,** who was recently elected a director of Texas Gas Corp., an affiliate. Moore will continue as manager of gas sales for Pan American Petroleum. Also, **E. A. Renfro,** vice president of Pan American Gas, has been elected a director.

E. J. Green, petroleum engineer with Standard Oil Co. of Texas in Monahans, Tex., has joined Natural Gas Pipeline Co. of America in Amarillo, Tex., as drilling engineer.

Robert R. Dixon, station superintendent for Houston Texas Gas & Oil Corp., in Brooker, Fla., has been promoted to staff engineer in St. Petersburg, Fla.

R. D. Hammett, station operator with Texas Eastern Transmission Corp. in Lafayette, Ind., has joined Transwestern Pipeline Co. as section foreman in Mountainair, N. M.

O. B. Denny, assistant district superintendent in Interstate Oil Pipe Line Co.'s Raceland, La., district, is on loan to Esso Libya as chief inspector on construction of the company's new Libyan crude line. **Dee McKinley,** operations engineer for Interstate, will succeed Denny.

Harry A. Gaynor, southern Nevada and southeastern California district sales manager for Standard Oil Co. of California, Western Operations, Inc., has been appointed Santa Barbara, Calif., district sales manager.

Henry Goodrich has been transferred from Union Producing Co.'s Tyler, Tex., district office to the Shreveport, La., general office as geologist. **Thomas L. Liles,** petroleum engineer, has been transferred to Refugio, Tex., from Houston. **Doyle E. Gore** has been transferred to Beeville, Tex., from Pettus, Tex., as petroleum engineer. **Thomas B. Fischer,** assistant petroleum engineer, has been transferred to Pettus from Refugio. **William A. Brown,** Shreveport, has been transferred to Houma, La., as assistant petroleum engineer.

Henry Salvatori, chairman of Western Geophysical Co. of America, has been elected to the University of Southern California board of trustees.

William K. Whiteford, president of Gulf Oil Corp., has been elected a director of International Nickel Co. of Canada, Ltd.

E. E. Moore has been appointed general manager of Canadian operations for Gardner Brothers Drilling Co., Ltd. He succeeds **W. R. Harrington,** vice president, who has been transferred to the company's Dallas headquarters. Moore will headquarter in Calgary.

D. W. Calvert, administrative assistant to the manager of Phillips Petroleum Co.'s supply and transportation department, has been promoted to assistant manager, transportation division. Calvert will be responsible for automotive, railroad, and marine transportation equipment operations.

Stephen D. Semegran has joined California Research Corp.'s producing research staff as research engineer at the La Habra, Calif., laboratory. New research engineers at the Richmond, Calif., laboratory are **Finn Hanskjold,** engine-lubricants section; **Lawrence E. Santucci, Jr.,** fuel oils, asphalts, and special products; and **Carl D. Karaba,** greases and industrial lubricants section. **Victor A. Rundle** has been named research chemist in fuel oils, asphalts, and special products, Richmond laboratory.

Deaths

Michael Halpern, 67, retired senior vice president and a director of Texaco Inc., died August 16 while vacationing at Shawnee-on-Delaware, Pa. Halpern joined Texaco in 1916 in Bayonne, N. J. He had been assistant manager of the refining department and general manager, refining, before being elected a vice president in 1940. He was named a director in 1946. He retired 3 years ago.

George Alfred Esty, 68, retired superintendent of the Bayonne, N. J., refinery of Humble Oil & Refining Co.'s Esso Sstandard division, died July 28 at his home in the Virgin Islands after a long illness. Esty retired in 1953.

DuBois Eastman, 54, director of the Montebello, Calif., research laboratory of Texaco Inc., died August 12 in Whittier, Calif. Eastman had been with Texaco since 1928.

▶▶▶ Personals

Jerry B. Allen, drilling foreman with Pan American Petroleum Corp., has been transferred to Vernal, Utah, from Craig, Colo.

Dr. H. A. Holcomb has been promoted to section head in chemicals development research for Humble Oil & Refining Co. in Baytown, Tex.

Dr. Robert R. White, director of the institute of science and technology at the University of Michigan, has been elected a vice president of Atlantic Refining Co. He will serve as general manager of the research and development department.

Paul E. Schmidt and **Richard E. Van Strien** have been appointed section leaders in chemicals research at the Whiting, Ind., research laboratories of Standard Oil Co. (Ind.). New group leaders in chemicals research will be **Richard J. Ross** and **Benjamin A. Bolton.**

Bruce K. Brown has resigned as chairman of Petroleum Chemicals, Inc., subsidiary of Cities Service Oil Co. and Continental Oil Co. He will open consulting offices September 1 in New Orleans. Brown was a director and vice president in charge of research and development for Standard Oil Co. (Ind.) at one time, and also was president of the old Pan-Am Southern Corp. He served as deputy administrator of the Petroleum Administration for Defense during the Korean War. He joined Petroleum Chemicals in 1956 as president.

John C. Martin, formerly with Creole Petroleum Corp., has joined California Research Corp.'s La Habra, Calif., laboratory as senior research engineer, reservoir engineering.

Osgood V. Tracy, retired president of Humble Oil & Refining Co.'s Esso Standard division, has been elected an executive vice president and a director of W. R. Grace & Co. He will be in charge of chemical business of the company and will be responsible for the seven operating divisions and the research division.

Tracy retired this month after 30 years with Standard Oil Co. (N. J.) companies. He had served as president of Enjay Chemical Co. from 1952 to 1958 before becoming president of Esso Standard in 1959. The Grace appointment is effective September 1.

Chester P. Farmer, assistant district superintendent for Texaco Inc. in Hobbs, N. M., has been named Farmington, N. M., district superintendent.

H. M. Bayer, Gulf Oil Corp. vice president in Fort Worth, has retired after 36 years with the company. Bayer had been chief geologist for the Fort Worth area and division manager of exploration before being named a vice president and Fort Worth division manager in 1953.

E. C. Sprotte has been named San Joaquin division geologist for Shell Oil Co. in Bakersfield, Calif.

D. J. (Jack) Greene has been appointed northwest sales representative for Anchor Petroleum Co. He will headquarter in Portland, Ore.

W. Rolland Stewart, vice president and general manager of Bay Refining Co., has resigned in order to devote full time to other business interests. He had been with Bay since 1945.

J. W. Roark, vice president in charge of sales for Union Petroleum Corp., Tulsa, has been named executive vice president. **R. E. Logsdon** has been named manager of the domestic and industrial sales department, and **W. G. Noble, Jr.,** has been appointed manager, refinery and chemical sales department.

E. W. Bowerman, assistant head of research and development in Baytown, Tex., for Humble Oil & Refining Co., Humble division, has been named product manager of Enjay Chemical Co. division's new chemical-raw material division. **A. C. Matthies,** product manager of Enjay's old chemicals division, has been named product manager for the new industrial chemicals division. The former chemicals division was split up to form the new units.

Charles H. Lane, 74, Houston independent operator, died August 14 at his Houston home after a heart attack.

Clark Raymond Edgecomb, Sr., 76, owner of Midland Petroleum Co., Long Beach, Calif., died August 11. He was vice president and general manager of Midland for many years before buying the company.

Richard Price Lawrence, 38, manager of scheduling and dispatching for Oklahoma Mississippi River Products Line, Inc., Tulsa, was killed August 12 in an auto accident near Vivian, La. He had been with the company and its affiliates since 1947.

Edward F. Freiner, 51, traffic manager for Humble Oil & Refining Co.'s Carter division in Billings, Mont., died August 10 in a Billings hospital after a heart attack. Freiner had been with Humble since 1950.

Edward D. Sheridan, 90, pioneer independent operator in the western Pennsylvania area, died August 3 at his home in Pittsburgh. He had been in the oil industry since 1885 as driller, independent producer, and equipment manufacturer.

Richard J. Bauer, 55, vice president of Gardner-Denver Co. in Dallas, died August 9 at his home in Dallas after a heart attack. He had been with Gardner-Denver since 1923.

James Hyle Turner, 67, general superintendent of Murphy Oil Co. of Oklahoma, died August 11 in a Tulsa hospital. Turner had been with Murphy since 1929.

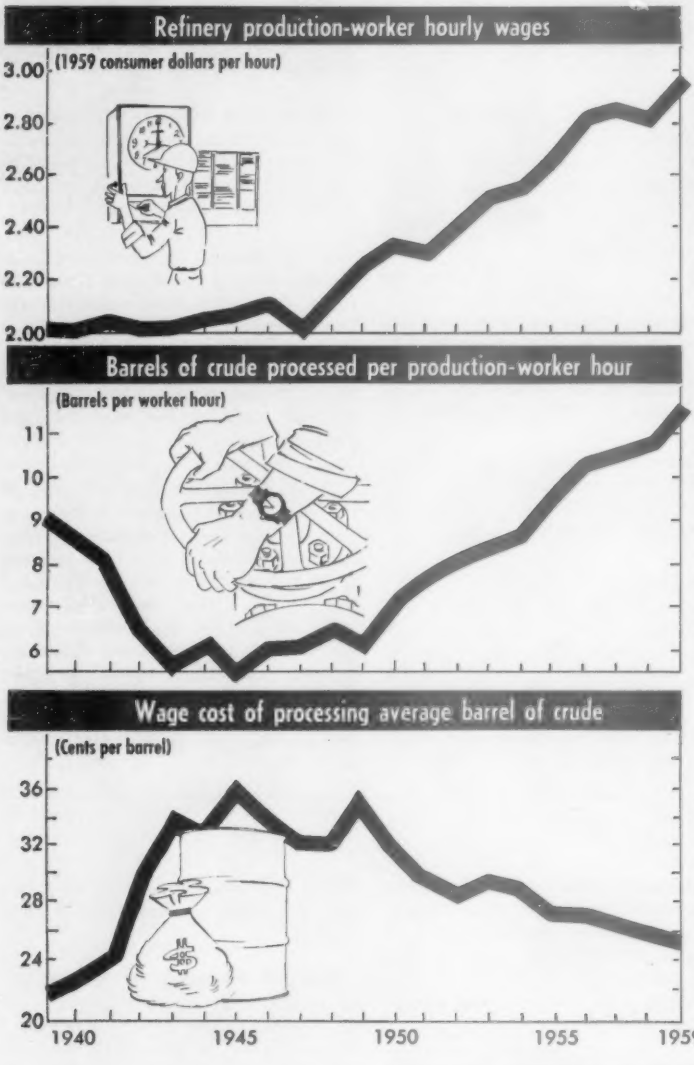
Frank Bryan, 70, one of the founders of American Association of Petroleum Geologists, died August 17 in a Groesbeck, Tex., hospital. Bryan was geologist with the old Gypsy Oil Co., a Gulf Oil Corp. subsidiary, before becoming an independent consultant.

James P. Flanagan, 80, retired Tulsa independent operator and producer, died August 12 at his home in Tulsa. Flanagan was with Bovaird Supply Co. and had been president of Sinclair Oil Co. of Louisiana before becoming an independent. He was a director of the International Petroleum Exposition for many years.

Gilbert Charles Haas, 43, engineer in Phillips Petroleum Co.'s North Burbank unit, Shidler, Okla., was killed August 14 in an auto accident near Hot Springs, Ark.

Robert Lee Belt, 51, instrument engineer at the Arkansas City, Kans., refinery of Anderson-Prichard Oil Corp., died August 15 at his home after a heart attack.

Automation keeps rein on mounting wages



Refinery wages rose sharply after W.W. II even with correction for inflation...

Hourly wage of average refinery worker in 1959 was 3.5 times 1939 rate. Even after correction for inflation, he was making almost 1.5 times as much per hour as in 1939. Wage gains have been sharper since 1947.

Higher wages hastened automation. Barrels per worker increased after war's end...

Increased processing costs, including higher wages, called for a decision by the refiner. He had to cut costs or raise prices. He cut costs. Increased automation boosted barrels per worker hour by 80%.

End result – drop in wage cost of processing average barrel of crude...

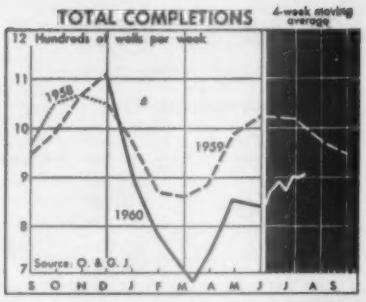
Wage expense for refining crude reached a peak of 36.5 cents a barrel back in 1945. This cost is expressed in 1959 consumer dollars. There has been a general decline in wage-per-barrel rate since 1949 with average for 1959 down to 25.7 cents.

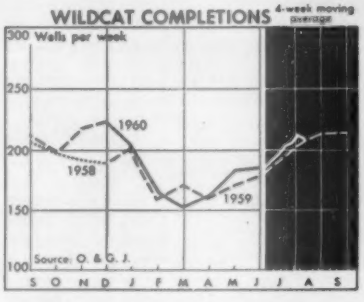
. . . a tale in three charts

as told by
JOHN C. CASPER

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,828,550	DOWN	10,865	UP	15,400
Crude stocks	241,163,000	DOWN	1,658,000	DOWN	20,299,000
Completions	980	UP	70	UP	34
Refinery runs	8,335,000	UP	81,000	UP	385,000
Gasoline stocks	191,838,000	DOWN	1,809,000	UP	8,734,000
Kerosine stocks	31,224,000	UP	522,000	UP	1,751,000
Distillate stocks	140,647,000	UP	6,598,000	DOWN	7,260,000
Residual stocks	43,969,000	UP	955,000	DOWN	11,556,000
Four-product stocks	407,678,000	UP	6,266,000	DOWN	8,331,000
Total imports	1,762,500	DOWN	45,800	UP	400,200





Active Rotary Rigs

	8-15-60	8-8-60	8-17-59
Alabama	4	4	9
Alaska	7	7	(†)
Arkansas	13	12	12
Arizona	1	1	1
California	83	78	84
Land	81	76	82
Offshore	2	2	2
Colorado	37	36	54
Florida	2	2	2
Land	2	2	1
Offshore	0	0	1
Illinois	38	41	33
Indiana	9	13	6
Iowa	0	0	2
Kansas	100	106	139
Kentucky	3	2	13
Louisiana	299	301	336
North	41	46	44
S. Inland waters	121	115	128
S. Land	75	85	109
Offshore	62	55	55
Maryland	1	1	0
Michigan	41	48	30
Mississippi	61	63	74
Missouri	1	1	1
Montana	23	22	28
Nebraska	19	28	32
Nevada	0	0	1
New Mexico	112	105	119
New York	0	0	1
North Dakota	16	16	24
Ohio	6	5	4
Oklahoma	163	165	220
Oregon	1	1	10
Pennsylvania	13	13	7
South Dakota	0	0	0
Texas	551	560	782
S. Inland waters	5	3	8
S. Land	169	171	214
Offshore	0	0	2
North	44	42	156
Panhandle	39	45	(*)
East	45	41	(*)
West Central	152	158	268
West	97	100	134
Utah	30	26	37
Washington	1	1	2
West Virginia	5	4	10
Wyoming	62	66	73
Total U. S.	1,702	1,728	2,146
Western Canada	160	184	155
Eastern Canada	0	0	0
Grand total	1,862	1,912	2,301

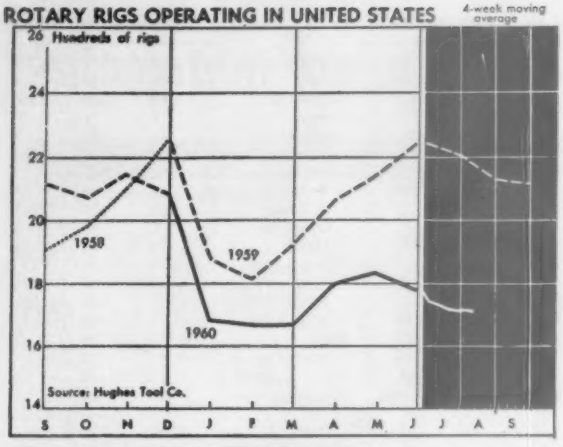
Hughes Tool Co. report. *Included in North. Comparisons not available due to change in method of reporting. †Data first reported 4-4-60.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 13, 1960

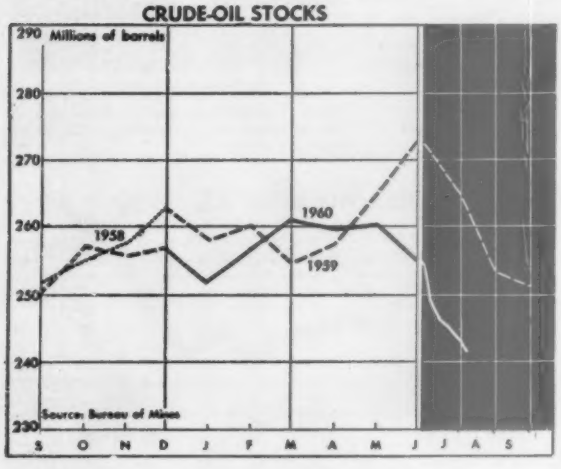
	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1960	1959	Total	Crude	Cond.	Gas	Dry	1960	1959
Alabama	3	2	0	0	1	0	23,950	31	60	1	0	0	0	1	2	16
Arizona	0	0	0	0	0	0	0	25	.....	0	0	0	0	0	18	.....
Arkansas	3	1	0	0	2	0	10,012	366	523	0	0	0	0	0	99	91
California	30	12	0	1	16	1	184,472	1,016	939	11	0	0	1	10	193	230
Colorado	15	1	0	2	12	0	68,314	385	472	9	0	0	0	9	194	282
Illinois	46	14	0	0	20	12	86,990	1,293	1,354	14	1	0	0	13	280	220
Indiana	18	6	0	1	11	0	27,394	594	502	4	0	0	1	3	224	164
Kansas	62	33	0	7	21	1	243,305	1,959	2,486	17	3	0	2	12	636	589
Kentucky	83	27	0	7	19	30	100,502	1,093	1,530	1	1	0	0	0	114	132
Louisiana	68	32	6	9	21	0	480,369	1,140	2,240	9	1	0	0	7	337	295
North	34	19	0	7	8	0	131,092	791	828	5	1	0	0	4	161	120
South	27	9	6	1	11	0	274,064	1,039	1,174	4	0	0	0	4	154	163
Offshore	7	4	0	1	2	0	75,213	310	238	0	0	0	0	0	22	12
Michigan	32	14	0	1	9	8	98,846	534	384	5	0	0	0	5	145	96
Mississippi	7	1	0	0	6	0	64,787	427	386	5	0	0	0	5	161	173
Montana	5	2	0	0	3	0	33,498	185	196	1	0	0	0	1	89	61
Nebraska	29	12	0	0	16	1	171,373	537	541	8	1	0	0	7	221	232
New Mexico	44	24	1	7	12	0	276,239	1,143	1,250	10	2	1	0	7	179	150
West	11	2	0	6	3	0	50,733	378	572	1	0	0	0	1	41	43
East	33	22	1	1	9	0	225,506	765	678	9	2	1	0	6	138	107
New York	0	0	0	0	0	0	0	205	172	0	0	0	0	0	26	16
North Dakota	4	1	0	0	3	0	28,385	184	313	3	0	0	0	3	49	61
Ohio	18	7	0	2	9	0	36,816	614	602	0	0	0	0	0	33	17
Oklahoma	124	60	3	9	28	24	367,327	2,919	3,595	16	2	0	0	14	473	539
Pennsylvania	63	20	0	15	6	22	165,878	440	335	0	0	0	0	0	8	9
South Dakota	0	0	0	0	0	0	0	17	.....	0	0	0	0	0	6	.....
Texas	284	142	16	16	106	4	1,266,995	9,794	11,871	66	5	1	0	60	2,041	2,214
Dist. 1	15	6	1	1	7	0	38,345	666	692	5	1	0	0	4	253	197
Dist. 2	14	6	2	1	5	0	86,832	465	500	5	0	0	0	5	115	148
Dist. 3	34	12	5	0	17	0	225,497	768	749	5	0	0	0	5	144	148
Dist. 4	30	15	0	6	9	0	140,898	670	821	8	2	0	0	6	190	200
East	19	9	3	0	7	0	98,444	784	740	5	0	1	0	4	166	143
Dist. 7-B	35	10	1	1	23	0	101,698	1,424	1,626	20	0	0	0	20	412	423
West	69	45	0	2	21	1	362,381	2,577	3,681	10	0	0	0	10	405	508
Dist. 9	49	32	1	0	15	1	118,236	1,799	2,231	7	2	0	0	5	315	379
Dist. 10	19	7	3	5	2	2	94,664	641	831	1	0	0	0	1	41	68
Utah	5	3	0	0	2	0	28,942	161	200	1	0	0	0	1	55	54
West Virginia	15	0	0	14	1	0	46,082	486	470	0	0	0	0	0	4	15
Wyoming	19	12	0	1	6	0	94,927	638	593	6	0	0	0	6	257	200
Misc. (N.C.)	3	0	0	0	3	0	4,896	92	78	3	0	0	0	3	84	45
Total U. S.	980	426	26	92	333	103	3,910,299	27,278	31,092	190	16	2	4	168	5,928	5,901
Prev. week	910	381	32	67	360	70	3,789,967	.....	.....	208	24	2	5	177	.....	.....
Cum. 1960	27,278	12,553	816	2,233	10,549	1,127	116,669,056	.....	.....	5,928	529	66	191	5,142	.....	.....
Cum. 1959	31,092	15,724	762	2,261	11,533	812	128,896,777	.....	.....	5,901	564	79	176	5,082	.....	.....
Western Canada	61	36	0	10	13	2	309,999	1,412	1,551	16	3	0	4	9	386	450

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	8-6-60	7-30-60	8-8-59
Pennsylvania	2,303	2,201	2,596
Other Appalachian	1,795	1,768	2,112
Illinois, Indiana, Michigan	9,650	9,201	9,948
Nebraska and North Dakota	2,922	2,668	3,067
Kansas	8,805	9,028	9,691
Oklahoma	16,541	16,767	16,340
Arkansas	1,814	1,845	2,144
Louisiana	18,024	17,738	19,229
North	3,246	3,127	3,066
South	14,778	14,611	16,163
Mississippi, Alabama, Florida	2,367	2,286	2,689
New Mexico	8,510	8,244	7,751
Texas	100,613	102,420	114,159
East Texas	8,174	8,312	8,877
West Texas	46,616	47,656	53,652
Texas Gulf	17,001	16,700	19,971
Other Texas	28,822	29,752	31,659
Wyoming	16,857	16,846	15,353
Other Rocky Mountain	9,565	10,367	9,828
California	27,222	27,978	31,250
Foreign	†14,175	13,464	15,305
TOTAL	**241,163**	242,821	261,462

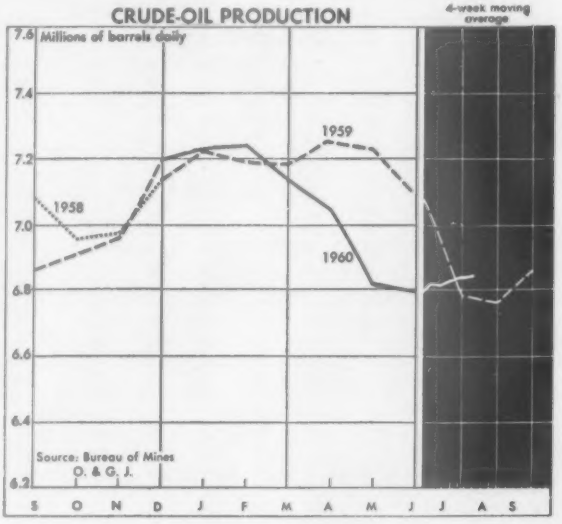
*Bureau of Mines. †Includes 3,611,000 bbl. in California.

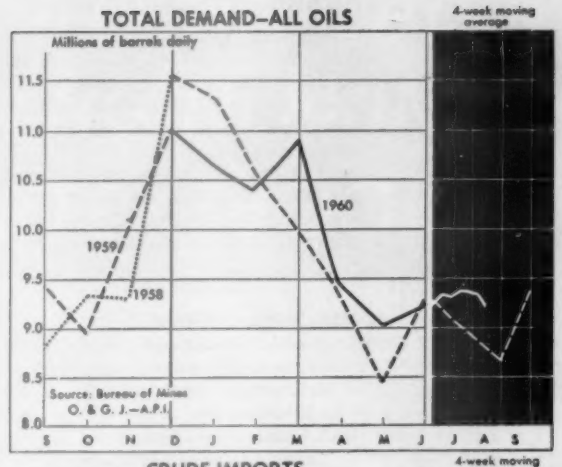
DAILY AVERAGE PRODUCTION FOR WEEK

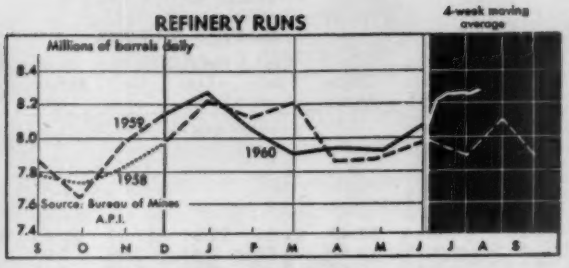
	August 13, 1960			August 6
	Crude oil	Lease Condensate	Total	total
Alabama	16,100	.....	16,100	16,000
Arkansas	81,850	250	82,100	82,000
California	838,100	.....	838,100	837,600
Colorado	128,900	.....	128,900	130,100
Eastern	40,500	.....	40,500	41,000
Florida	1,000	.....	1,000	1,000
Illinois	216,400	.....	216,400	219,300
Indiana	32,600	.....	32,600	33,100
Kansas	†290,875	.....	†290,875	†294,215
Kentucky	63,400	.....	63,400	63,600
Louisiana	945,575	120,700	1,066,275	1,066,100
North	105,300	5,700	111,000	110,825
South	840,275	115,000	955,275	955,275
Michigan	39,500	.....	39,500	39,500
Mississippi	131,575	3,450	135,025	135,025
Montana	83,000	.....	83,000	82,100
Nebraska	68,000	.....	68,000	67,900
Nevada	100	.....	100	100
New Mexico	288,275	6,700	294,975	294,975
North Dakota	66,100	.....	66,100	64,000
Oklahoma	†486,100	.....	†486,100	†498,400
Texas	2,352,575	85,250	2,437,825	2,437,825
Dist. 1	41,000	2,500	43,500	43,500
Dist. 2	96,300	8,100	104,400	104,400
Dist. 3	309,275	36,000	345,275	345,275
Dist. 4	164,575	14,450	179,025	179,025
Dist. 5	26,000	300	26,300	26,300
Dist. 6	104,575	9,800	114,375	114,375
East Texas field	122,000	.....	122,000	122,000
Dist. 7-B	127,425	125	127,550	127,550
Dist. 7-C	111,000	3,250	114,250	114,250
Dist. 8	950,425	8,000	958,425	958,425
Dist. 9	193,000	1,800	194,800	194,800
Dist. 10	107,000	925	107,925	107,925
Utah	89,300	.....	89,300	87,200
Wyoming	351,000	.....	351,000	347,000
Others	‡1,375	.....	‡1,375	‡1,375
Total U. S.	6,612,200	216,350	**6,828,550**	6,839,415
Change from prev. week, down		.....	**10,865**	
Canada	†475,386	.....	†475,386	†547,000
Total U. S. Prod.-Jan. 1-Aug. 13			1,582,196,800 bbl.	
Same period last year (crude plus cond.)			*1,600,616,500 bbl.	

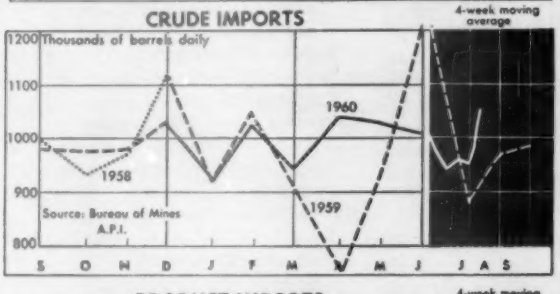
*Includes 42,371,900 bbl. condensate. †Week ended previous Monday. ‡Alaska and South Dakota, and Arizona.

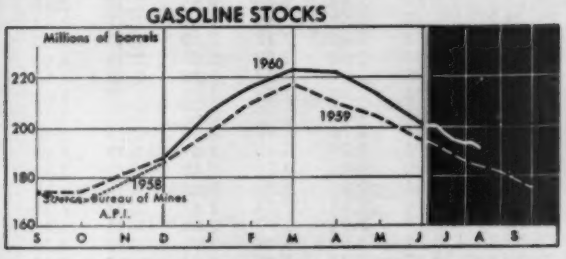
CRUDE-OIL PRODUCTION

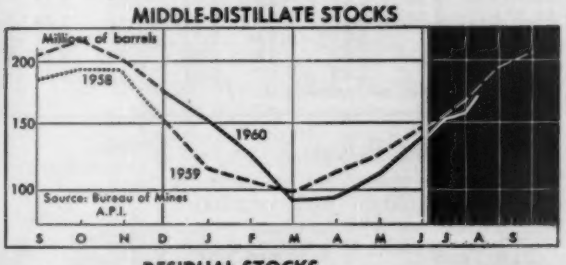


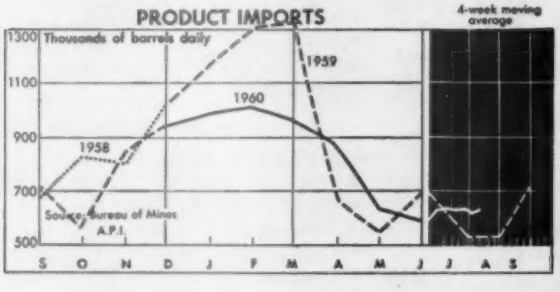


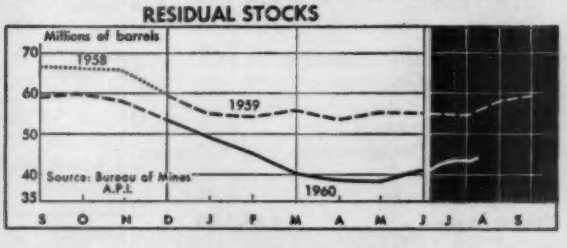












API REFINERY REPORT—AUGUST 12, 1960

(Thousands of barrels)

District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, August 1959—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,133	538.7	38.1	348.3	157.0	45,035	11,897	50,368	11,862	1,150	547.8	27.0	328.3	146.8
Appalachian:														
District 1 ..	91	39.3	6.4	21.8	5.7	6,066	698	3,117	412	93	41.2	2.7	21.8	6.0
District 2 ..	111	54.1	4.4	22.8	10.1	3,036	403	1,497	255	105	58.9	1.6	18.8	8.5
Ind., Ill., Ky. ..	1,557	822.7	67.0	333.4	137.9	33,624	6,374	24,669	5,569	1,436	772.0	53.8	298.9	125.2
Minn., Wis., Dak.	129	57.1	14.3	25.9	20.3	6,052	1,462	6,980	601	102	50.7	2.8	27.6	9.9
Okla., Kans., Mo.	750	406.6	11.3	190.0	19.9	16,807	1,665	11,580	1,034	719	393.3	7.0	175.2	18.9
Inland Texas ..	314	231.3	5.0	58.9	21.7	6,527	607	1,627	2,499	306	226.7	7.2	52.0	21.8
Tex. Gulf Coast	1,876	1,020.2	141.6	442.6	121.1	24,635	3,239	14,984	4,892	1,843	958.3	77.3	446.3	168.9
La. Gulf Coast.	698	381.4	68.0	179.3	45.9	10,209	1,972	7,032	1,488	717	385.0	48.0	172.3	51.0
N. La. and Ark.	112	62.1	7.9	20.4	5.6	5,418	1,028	1,624	138	67	27.3	2.0	13.6	5.1
Rocky Mountain:														
New Mexico.	26	12.6	0.6	5.1	3.3	643	41	123	7	27	14.1	0.4	5.5	2.0
Other Rky. Mt.	310	140.7	2.1	67.9	35.1	5,493	375	2,721	844	318	148.2	2.0	62.9	34.0
West Coast ...	1,228	521.1	36.6	185.6	286.4	28,293	1,463	14,325	14,368	1,198	542.4	2.5	180.7	285.5
Aug. 12, 1960	8,335	4,287.9	403.3	1,902.0	870.0	191,838	31,224	140,647	43,969	8,081	4,165.9	234.3	1,803.9	883.6
Aug. 5, 1960	8,254	4,148.6	356.0	1,839.0	829.3	193,647	30,702	134,049	43,015	.....	.....	.....	.....	.....
Aug. 14, 1959	7,950	4,153.9	277.0	1,717.7	827.6	183,104	29,473	147,907	55,525	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil Prices

GRAVITY SCHEDULE

	Signal Hill, Calif.	Okla-homa	West Tex. (sour)	West Tex. (Inter.)	No.* Texas	Texas Refugio Light	Bayou Sale (La.)	Denver Jules-burg	Wyo. (sour)
14-14.9	$1.76	....	....	....	....	....	....	....	....
15-15.9	1.84	....	....	....	....	....	....	....	$1.81
16-16.9	1.92	....	....	....	....	....	....	....	1.86
17-17.9	2.00	....	....	....	....	....	....	....	1.91
18-18.9	2.08	....	....	....	....	....	....	....	1.96
19-19.9	2.16	....	....	....	....	....	....	....	2.01
20-20.9	2.24	$2.49	$2.35	$2.61	$2.29	$2.95	$2.90	$2.58	2.06
21-21.9	2.32	2.52	2.38	2.63	2.33	2.97	2.92	2.60	2.11
22-22.9	2.39	2.55	2.41	2.65	2.37	2.99	2.94	2.62	2.16
23-23.9	2.46	2.58	2.44	2.67	2.41	3.01	2.96	2.64	2.21
24-24.9	2.53	2.61	2.47	2.69	2.45	3.03	2.98	2.66	2.26
25-25.9	2.60	2.64	2.50	2.71	2.49	3.05	3.00	2.68	2.31
26-26.9	2.67	2.67	2.53	2.73	2.53	3.07	3.02	2.70	2.36
27-27.9	2.74	2.70	2.56	2.75	2.57	3.09	3.04	2.72	2.49
28-28.9	2.81	2.73	2.59	2.77	2.61	3.11	3.06	2.74	2.54
29-29.9	2.87	2.76	2.62	2.79	2.65	3.13	3.08	2.76	2.59
30-30.9	2.93	2.79	2.65	2.81	2.69	3.15	3.10	2.78	2.63
31-31.9	3.00	2.82	2.68	2.83	2.73	3.17	3.12	2.80	2.67
32-32.9	3.06	2.85	2.71	2.85	2.77	3.19	3.14	2.82	2.71
33-33.9	3.12	2.88	2.74	2.87	2.81	3.21	3.16	2.84	2.75
34-34.9	3.17	2.91	2.77	2.89	2.85	3.23	3.18	2.86	2.79
35-35.9	3.22	2.94	2.80	2.91	2.89	3.25	3.20	2.88	2.83
36-36.9	3.27	2.97	2.83	2.93	2.93	3.27	3.22	2.90	2.87
37-37.9	3.31	2.99	2.86	2.95	2.95	3.29	3.24	2.92	2.89
38-38.9	....	3.01	2.89	2.97	2.97	3.31	3.26	2.94	2.91
39-39.9	....	3.03	2.92	2.99	2.99	3.33	3.28	2.96	2.93
40-44.9	....	3.05	2.95	3.01	3.01	3.35	3.30	2.98	2.95

*Cooke, Grayson, Montague.

Flat Prices

Louisiana:
Sweet Lake $3.00

Texas:
East Texas 3.05-3.25
Conroe 3.23-3.53
Van 3.08

Pennsylvania Grade:
Bradford $4.75-4.80
Middle District 4.52
Southwest Pennsylvania 4.25
West Virginia 4.17
Buckeye Grade 4.08

Illinois Basin **2.85-3.00**

Foreign

Middle East, Persian Gulf: (cargoes f.o.b. lifting port)
★ Arabian, 34.0-°-34.9°, Ras Tanura $1.76-1.80
★ Iranian, 34.0°-34.9°, Bandar Mashur 1.74-1.78
★ Iranian, 34.0°-34.9°, Abadan 1.69-1.73
★ Iraq, 35.0°-35.9°, Fao 1.68-1.74
★ Kuwait, 31.0°-31.9°, Mina-al-Ahmadi ... 1.58-1.59
★ Qatar, 41.0°-41.9°, Umm Said 1.91-1.93

Middle East, E. Mediterranean:
★ Arabian, 34.0°-34.9°, Sidon $2.13-2.17
★ Iraq, Mosul-Kirkuk, 35.0°-35.9°, Tripoli . 2.15

Far East (cargoes, f.o.b. Lutong, Sarawak):
Seria Light, 37° 2.57

Canada:
Leduc-Woodbend $2.53
Redwater (Alta.) 2.42
Smiley (Sask.) 2.18
Pembina 2.38

Venezuela:
Cumarebo, 47°-47.9°, Tucupido 3.34
San Joaquin, 40°-40.9°, Puerto La Cruz 3.08
Oficina, 35°-35.9°, Puerto La Cruz 2.80
Tia Juana medium, 26°-26.9°, Amuay* 2.30
Quiriquire, 16.0°-16.4°, Caripito 2.10
Lagunillas heavy, flat, Las Piedras* 2.10
Bachaquero, flat, 15°-16°, Las Piedras* 1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Tanker Rates (Long Ton)

(Latest reported spot fixtures)
★ Carib.-NY, dirty (ATRS—52.5%) $1.31
★ Carib.-UK, clean (Scale—41.25%) (19s. 3d.) 2.70
★ PG-UK, dirty (Scale—62.5%) (24s. 2d.) 3.39
★ PG-NY, dirty (USMC—70.0%) 3.81

★Denotes change from previous week.

Refined-Product Prices

Following quotations are realistic spot prices for refined products moving interstate on Wednesday each week. They may differ from refiners' posted prices and should not be considered as postings.

Light-product prices are in cents per gallon. Residual and crude prices are dollars per barrel. Crude prices are at the well unless otherwise listed.

Gasoline*

Mid-Continent (Group 3):
Regular (91 octane) .. 12.25-12.50
Premium (99 octane) . 15.00-15.25
Natural gasoline (26-70) 4.5
Breckenridge 4.0

Gulf Coast (cargoes for coastwise or export movements):
Regular (90 octane) .. 11.00
Regular (92 octane) .. 11.25
Premium (98 octane) .. 12.25

California (rack) Los Angeles:
Regular (88 octane) .. 11.65-12.15
Premium (94 octane) . 12.65-13.15
Premium (100 octane) 14.00-14.65

Caribbean area (cargoes):
Regular (87 octane) .. 10.125-10.25
Premium (97 octane) .. 11.75

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

Kerosine and Distillate

Mid-Continent (Group 3):
★ Kerosine 42-44 .... 10.125-10.375
★ Diesel oil (58 d.i. and above) 9.75-10.00
★ Distillate No. 1 ..... 9.75-10.00
★ Distillate No. 2 ..... 8.75-9.00

Gulf Coast (cargoes):
Kerosine 41-43 ..... 9.00-9.25
Distillate No. 2 ..... 8.25

New York Harbor (barges):
Kerosine 41-43 ..... 10.05
Distillate No. 2 ..... 9.05
Diesel fuel, 48-52 d.i. 9.35

Caribbean area (cargoes):
Distillate No. 2 ..... 8.125

Residual Fuel (Bbl.)

Mid-Continent (Group 3):
Residual fuel (max. 1% S) $1.90

Gulf Coast (cargoes):
Bunker C fuel 2.35

New York Harbor (barges):
Bunker C fuel 2.52

Caribbean (cargoes):
Bunker C $2.10

California (rack):
Bunker C fuel, Los Angeles $2.15

★Denotes change from previous week.

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Large independent Oil Company has permanent position in natural gasoline plant in California for young engineer with ChE degree. Excellent working conditions. Salary commensurate with background and experience. Send complete resume: All replies confidential.

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The Oil and Gas Journal
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OR

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This is a job with a future for a man with ability and the capacity for top responsibility and growth.

Reply with full resume of experience and personal data. Replies will be held strictly confidential.

Box L-943
The Oil and Gas Journal
Tulsa, Oklahoma

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Should be familiar with FCC, HF Alkylation and Reforming Units. Growing company with excellent benefits.

Box L-958,
The Oil and Gas Journal
Tulsa, Oklahoma

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This is an opportunity for a man to become an officer of an established producing company, and calls for a high level man. In this position you would call on individuals who may be interested in investing funds in our oil properties. This will take you out not to exceed one-half your time. The other one-half your time would be spent in petroleum engineering.

Please give full particulars of qualifications and experience and reply to:

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Tulsa, Oklahoma

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Tulsa, Oklahoma.

SITUATIONS WANTED

DRILLING ENGINEER—Toolpusher; age 29, BS degree, thoroughly experienced in all phases of a drilling operation, 6 years experience from roughneck to drilling engineer—Toolpusher on big rigs. Both land, marine and offshore. Resume on request. Box L-938, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

PETROLEUM ENGINEER: B.S. Degree, Age 28. Three years employed as field engineer. Experience as roustabout and roughneck. Seeking job as engineer or production supervisor. Resume on request. Box L-947, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION SUPT. Petroleum Engr. Desires position either category. 17 years experience all phases drilling, producing operations both Major and Independents. Registered. Box L-941, The Oil and Gas Journal, Tulsa, Oklahoma.

SUBSURFACE PETROLEUM geologist: 17 years diversified exploration and exploitation experience. Will relocate. Box L-942, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST (M.S.) desires foreign employment. Ten years experience, two in Europe. 33, married, speaking knowledge of Italian and Spanish. Capable of organizing and managing exploration program. P. O. Box 449, Midland, Texas.

PRODUCTION SUPERVISOR, graduate engineer, benched at age 53 due to sale properties. Good health. Cost conscious. Long experience in production work. Compressor operation, small gasoline plant. Would like salaried job or contract operation of properties. Box, L-957, The Oil and Gas Journal, Tulsa, Oklahoma.

LAND CLERK—Retiring next October, legal education, perfect health, long experience leasehold records, contracts, division orders and related matters, desires employment small company or individual operator. Box L-949, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPELINE ENGINEER—13 years experience pipeline economics and design in refined products, crude oil and natural gas pipelines. 37 years of age. B.S.M.E. Complete Resume on request. Box L-951, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—seeking connection with oil investment group or independent producer to invest in excellent prospects for oil and gas in northern Rocky Mountains. Need capital for exploration. Five years well rounded training major companies. Ph.D. M.S. Age 35. Box L-965, The Oil and Gas Journal, Tulsa, Oklahoma.

PUBLIC RELATIONS Director integrated oil company desires change. Good radio-newspaper background. Experienced press relations, financial reports, etc. Established contacts. Box L-966, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST MS 1949—Experienced in management, research, subsurface, surface, photogeology, some mining. 5 years major company. Last 6 years operating own business. Desires change. Domestic or foreign. Box L-961, The Oil and Gas Journal, Tulsa, Oklahoma.

PROCESS ENGINEER, BS-Ch.E. 1952. Age 30, married, no children. Eight years combined experience domestic and overseas refinery technical service, operations planning and product blending. Desire supervisory position, small company. Location not critical. Available Feb. 1, 1961. Box L-963, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN — Employed supervisory capacity. 37, ten years experience all phases, Southwest and Rocky Mountain areas. Business and legal education. Desire association small company or independent as land manager or one-landman organization. Resume furnished. Box L-962, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST: 41, American, B.S. Mining Engineering. 19 years experience—16 years foreign work in Venezuela and Colombia. 9½ years administrative experience in Geophysical-Geological co-ordination with major independent. At present consulting. Seeking assignment in foreign work, preferably Central or South America. Will consider permanent position with future potential. Complete resume and references upon request. Apartado 4777 del Este, Caracas, Venezuela.

ROYALTIES

NOTICE INVESTORS, offering income producing Gas-Distillate royalty under 5 new, deep, dual completed, Frio sand wells on the Gulf Coast. Ogden Oil Company, P.O. Box 409, Ph. EL 2-3352, Taylor, Texas, Ph. HI 2-2471, Austin, Texas.

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WANTED: Area distributors for oil field product. Exclusive franchise. Supply store stock. Box L-939, The Oil and Gas Journal, Tulsa, Oklahoma.

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2—PRODUCING OIL wells with service station and 8-car garage. ¾ acre, 8 room house incl. furniture. $20,000 will handle. Owner, P. O. Box 632, Atwood, Calif. LAkeview 8-6131.

PRODUCTION WANTED

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LEASE AND DRILLING BLOCKS

185 ACRES: Seminole County, Okla., one Hunton Lime producing well. Adjacent to production. Priced reasonably. Box L-953, The Oil and Gas Journal, Tulsa, Okla.

WORKING INTEREST—KENTUCKY
22 wells on 4 leases. Sacrifice for $50,000.00 original investment. Cash needed. Box L-955, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—4,300 acres, Garrard County, Kentucky. Block contains two shut-in gas wells. Term leases to 1967. 25 Cent rentals paid to January 1961. Have Geologists report. Contact M. R. McCoy, Jr., 303 Barnes Building, Shreveport, Louisiana.

440 ACRE LEASE: Two bbls. daily. Six wells—180 ft. Electric jacks. Walter Vette, Rich Hill, Mo.

40 ACRES—Eastern Kansas with 4 proven inside locations Bartlesville Sand 715 ft. ⅜ths for sale, $400.00 per ⅛th. Reply: Box L-967, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING DEAL or entrepreneur wanted share basis, large lease acreage; Williston Basin, South Dakota. Excellent oil and gas subsurface geological reports. E. E. Erdman, Postoffice Box 424, Trenton, Nebraska.

WILL BEGIN DRILLING on 80 acres, Montgomery County, Kansas, offsetting heavy production. Need additional capital. All funds escrowed. For information please write: S. & M. Drilling & Production Co., P. O. Box 98, Cherryvale, Kansas.

LEASES, FARMOUTS available immediate area new shallow Illinois Basin discovery, Caldwell County, Kentucky. Also, will negotiate working interests for cash or drilling commitments. References. Can arrange for consultation with your legal and geological representatives if desired. J. B. Shrewsbury, Princeton, Kentucky. Phone EM 5-6119.

STONE BLUFF—80 acres—drilling two new wells offset to original good natural producers. From my experience recovering oil from this kind of pool by fracturing and secondary recovery has been successful, eliminating some wildcat risk. Pipe line. ⅛—$1,000; ¼—$2,000; ½—$4,000, both wells. L. Price, Coweta, Okla.

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1,600 acres west flank Cincinnati Arch, leased by responsible parties. Good geophysical data. 9 possible pay zones. Shallow production anticipated. Want financing to drill and complete first well. Will exchange bank references.

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311 Peoples National Bank Bldg., Tyler, Texas

LEGAL

SALE OF OIL AND GAS MINING LEASES, TRIBAL AND ALLOTED INDIAN LANDS. Department of the Interior Bureau of Indian Affairs, Uintah and Ouray Agency, Fort Duchesne, Utah.

SEALED BIDS will be received until 2:00 P.M. Mountain Standard Time, September 7, 1960, and opened at that time in the office of the Uintah and Ouray Agency, Fort Duchesne, Utah, for the leasing of 940.92 acres of Tribal Indian lands, and 10,428.38 acres of allotted Indian lands, located in Townships 8, 9 and 11 South, Ranges 19, 20, 21 and 22 East, Salt Lake Meridian, Uintah County, Utah, for oil and gas mining purposes. Details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to the Superintendent, Uintah and Ouray Indian Agency, Fort Duchesne, Utah.

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The Oil and Gas Journal

Box 1260 Tulsa, Okla.

ADVERTISERS

. . . in this issue

A

Allis-Chalmers 30, 31
Aluminum Company of America 85
Amercoat Corporation 121
American Iron & Machine Works Company Subsidiary, American Machine & Foundry Company ..... Back Cover
American Machine & Foundry Company—
American Iron & Machine Works Co. ..... Back Cover
Anderson Company, The V. D. 117
Aquaness Department, Atlas Powder Company 6
Arcco Instrument Company, Inc. 142

B

Baker Oil Tools, Inc. 42
Beckman Instruments, Inc. 94
Bethlehem Steel Company 92
Black, Sivalls & Bryson, Inc. 134, 135
BrakeSol, Inc. 100
Braniff International Airways 37
Brown & Root, Inc. 55
Burgess-Manning Company 36

C

C-B Southern, Inc. 116
Chiyoda Chemical Engineering & Construction Co., Ltd. 103
Classified Advertising 154, 155, 156
Coffing Hoist Division, Duff-Norton Company 132
Colorado Fuel and Iron Corp., Wickwire Spencer Steel Division 88, 89
Continental-Emsco Company, a Division of the Youngstown Sheet and Tube Company 26, 27
Coors Porcelain Company 114
Crose Perrault Equipment Corp. 110
Crossett Chemical Company Division of The Crossett Company 139
Cutler-Hammer, Inc. 20, 21

D

Darling Valve and Mfg. Co. 94
Day-Ray Products, Inc. 110
DeZurik Corporation 117
Dover Corporation—
The W. C. Norris Manufacturer Division 143
Dow Industrial Service 10
Dowell ..... 123, Inside Back Cover
Dresser Manufacturing Division 102
Drilling Equipment Manufacturing Co. 125
Duff-Norton Company 132

E

Equipment Engineers, Inc. 110

F

Fisher Governor Company 11
Food Machinery and Chemical Corporation, Chemical & Plastics Division 114
Franks Division of Cabot Shops, Inc. 19

G

Geolograph Oil Field Services 97
Goodrich Industrial Products Co., B. F. 3

H

Halliburton Company 12, 13
Hillman-Kelley 106
Homco 143
Humble Oil & Refining Co. 58
Hyatt Bearings Division, General Motors Corp. 1

I

International Business Machines Corporation 24

J

Jones Company, The S. M. 133

K

Kaiser Refractories & Chemicals Division, Kaiser Aluminum & Chemical Sales, Inc. 34
Kellogg Switchboard and Supply Company, Communications Division of International Telephone and Telegraph Corporation 5
Koppers Company, Inc.—
Tar Products Division 107

L

Lane-Wells Company ..... Inside Front Cover
Larkin Packer Company, Inc. 32
Latex Construction Company 16
Liberty Mutual Insurance Company .. 126
Loeb, Rhoads & Co., Carl M. 100

M

Magnet Cove Barium Corp. 124
Marbon Chemical Division of Borg-Warner 29
Mid-Continent Supply Company 113
Mission Mfg. Company 2
Mixing Equipment Co., Inc. 86

N

National Tank Company 158
Naugatuck Chemical Division of United States Rubber Company 14
Norris Manufacturer, W. C., Division of Dover Corporation 143

O

Ohio Injector Company, The 23
Oil and Gas Journal, The 153
Oil & Gas Properties Technical Services Co., Inc. 111
Oil Center Tool Co. 15
Oil Metering and Processing Equipment Corp. 35
Oil Well Supply Division 4
Otis Engineering Corporation 137

P

Paris Distributor, Inc., Henry H. 122
Petroleum Electric Power Assn. 141
Petroleum Equipment Suppliers Association 8, 9
Porter Company, Inc., H. K.—
Thermoid Division 97

R

Reed Roller Bit Company 108, 109
Reynolds Metals Company 40, 41
Ridge Tool Company, The 100
Robbins & Myers, Inc. 136
Rockford Clutch Division of Borg-Warner Company 138

S

Sauder Tank Co., Inc. 111
Sikorsky Aircraft, A Division of United Aircraft Corporation 118, 119
Southwestern Pipe, Inc. 120
Stewart & Stevenson Services, Inc. 7
Sumitomo Metal Industries, Ltd. 25

T

Tex-Tube Inc. 38
Thermoid Division, H. K. Porter Company, Inc. 97
Thomas Flexible Coupling Co. 91

U

United States Rubber Company 14
United States Steel Corporation—
Oil Well Supply Division 4
Universal Oil Products Company .. 22, 111

V

Vogt Machine Co., Henry 99

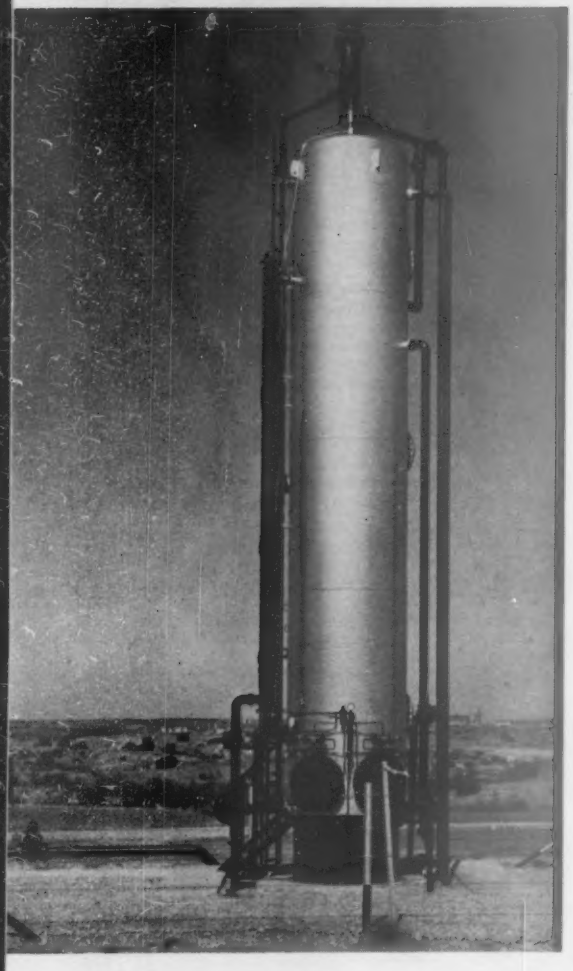
W

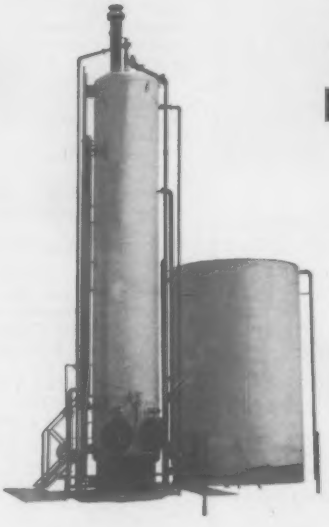
Wagner Electric Corporation 28
Well Equipment Mfg. Corp. 140
Wickwire Spencer Steel Division, Colorado Fuel and Iron Corp. 88, 89
Wisconsin Motor Corporation 144
Wolverine Tube Division of the Calumet Hecla, Inc. 17, 18
Worthington Corporation 104, 105

Z

Zink Company, John 112

NATIONAL'S *metering treater*





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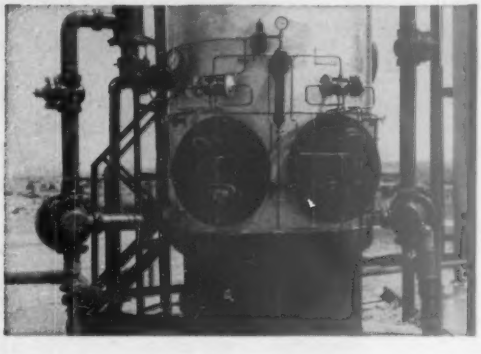

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